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CONTENTS

DEPARTMENTS

For complete table of contents see advertising page xxv

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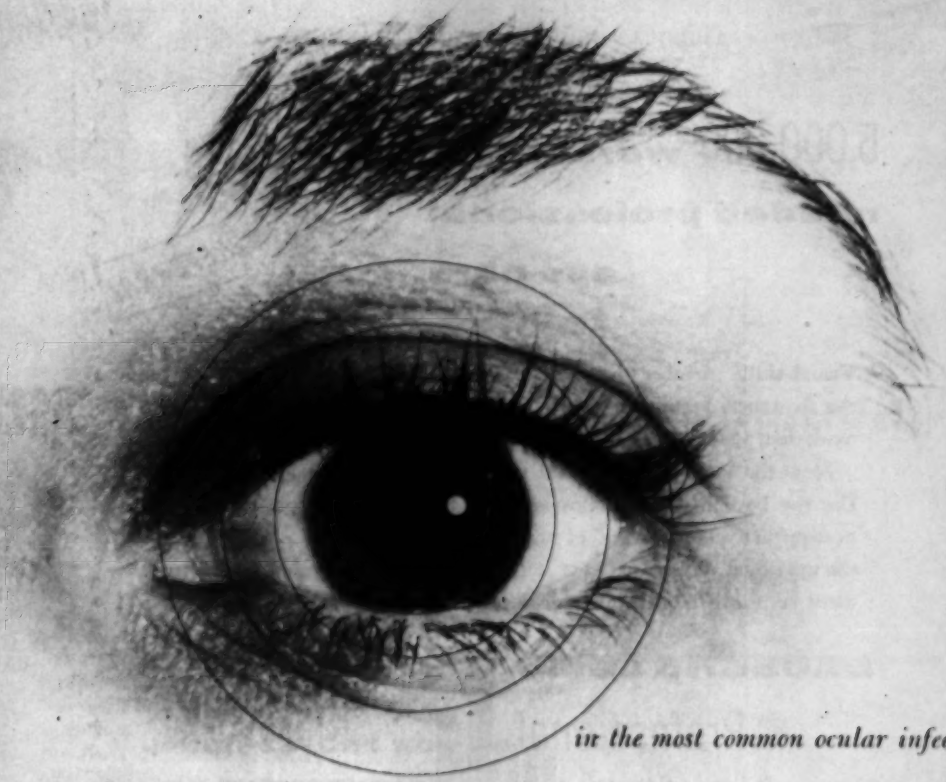

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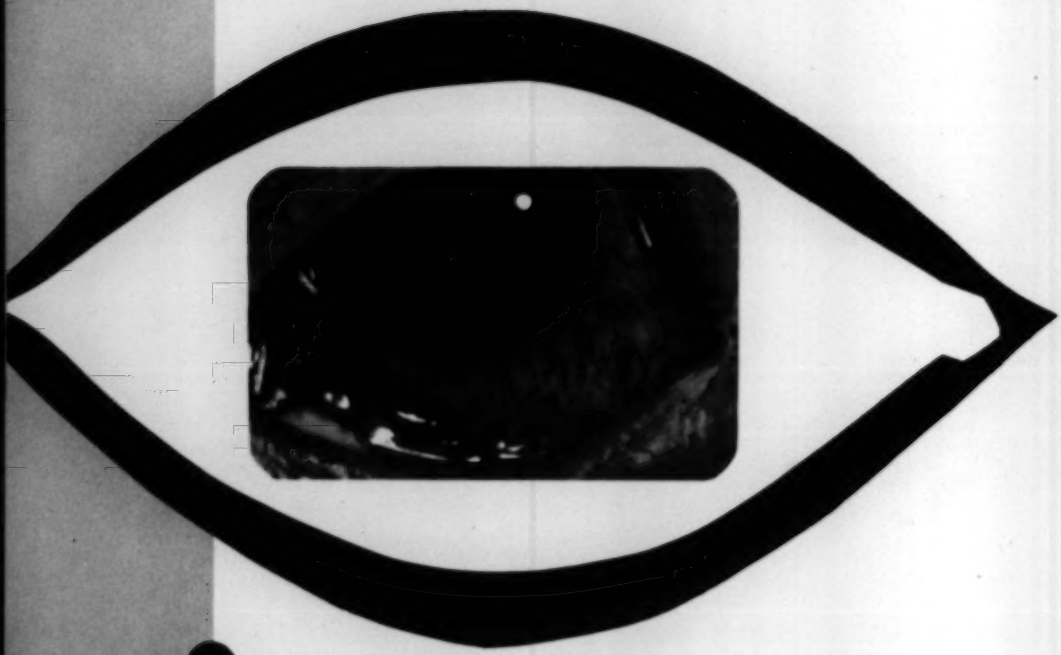

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It was decided to try cosmetic contact lenses on the boy. The procedure of fitting these lenses is as follows. A mold is made of both eyes and from these molds regular contact lenses are made incorporating any corrections that are necessary. These lenses are worn and adjusted until the patient is comfortable. Due to the lack of pupil "stops" the vision may not be all that is desired, but the mechanical wearability must be satisfactory. From these lenses opaque lenses are made, and on each lens the iris is painted by hand, leaving the pupillary areas clear. The optics necessary to satisfy the prescriptions are then ground on the pupillary areas and the lenses are ready for use.

With the proper light control as provided for by the painted iris, the vision in the case we are describing was very much improved. The improvement in appearance was remarkable. To any but a trained optical person, the boy's eyes were normal in every way.

Cosmetic contact lenses are also very often indicated where disfiguring burns or other accidents have marred the appearance of the patient. The same procedure is followed. If no distance correction is needed, the lenses can be ground without correction.

An aside here may be interesting. The first known contact lenses were used during the French revolution. They were not worn to improve vision but to change the color of the wearer's eyes and in so doing act as a disguise.

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CONTENTS

AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 40 AUGUST, 1955 NUMBER 2

SYMPOSIUM: RETROLENTAL FIBROPLASIA*
(RETINOPATHY OF PREMATURITY)

The Academy's symposiums are not planned as a series of papers expressing individual views on a common subject. The object is rather to have a qualified team give their concerted appraisal of a given subject. The panel is supposed to consider and weigh the mass of material on the subject and then to present to you, or shall we say charge the jury with, what the members of the panel believe to be tenable.

The subject this year is retrolental fibroplasia. The men on this panel have had five sessions in which to discuss and to try to agree on controversial aspects. What will be presented here is not, therefore, the view of the individual participant but the consensus of the group. It is said that the pronoun "we" is properly used under three circumstances: (1) when royalty speaks, (2) when one is speaking in an editorial sense, and (3) when one harbors a tapeworm. I think we can add to this a fourth—when one speaks as a member of this panel.

We are using the term retrolental fibroplasia because it is so deeply entrenched in ophthalmologic literature. We believe that the alternate term, retinopathy of prematurity, is a better one. Without further ado, therefore, we shall get on with the saga of retrolental fibroplasia.

Algernon B. Reese, M.D., *Moderator*
New York, New York

* * *

CLINICAL COURSE

WILLIAM COUNCILMAN OWENS, M.D.
Washington, D.C.

The initial changes of retrolental fibroplasia are usually seen clinically during the first month after the birth of the premature infant. Only rarely does the onset of the disease appear as late as the 10th week of life. The early changes, however, may be overlooked unless repeated careful examinations of the fundus are made during the early postnatal period.

The active phase of the disease may be slow and smoldering or, in contrast, rapid and violent. It usually subsides by the time the infant is six months of age, when it is followed by the cicatricial phase. In the cicatricial phase, the eyes show residual manifestations of scarring, disorganization, and destruction varying from clinically imperceptible changes to extensive atrophy. Thus, the clinical course of the disease may be divided into the *active phase*, the *period of regression*, and the *cicatricial phase*.

THE ACTIVE PHASE

During the active phase, the disease can be divided into five stages.

* Presented at the 59th annual session of the American Academy of Ophthalmology and Otolaryngology September 19-24, 1954, New York, New York.

Stage 1: The vascular stage

Usually the earliest change seen clinically is tortuosity and dilatation of the retinal vessels. In many cases, the veins become so large that they reach a size three or four times their normal diameter. The arteries may become so tortuous that they form sharp hairpin curves. In the periphery of the visible fundus, areas of neovascularization may be found. Usually the retinal vessels leading to such areas are somewhat larger than the dilated vessels seen in other areas of the retina. At the end of the vessels, fine, twiglike, delicate, newly formed vessels may be seen. Occasionally a transient narrowing precedes the dilatation of the retinal vessels.

Stage 2: Retinal stage

As the disease progresses, the vitreous becomes hazy and the neovascularization becomes more profuse. Gray areas appear in the retina. These are usually located peripheral to the equator, but may be found in the posterior pole. In these gray areas, the retina appears elevated. Usually the vessels become obscure or, in some cases, even completely covered as they pass through the gray patches. Retinal hemorrhages may occur. They may be large but usually are less than one disc diameter in size. At this stage it is often difficult to see the details of the fundus because of the vitreous haze.

Stage 3: Stage of early proliferation

As the disease enters the third stage, fine strands of newly formed vessels with their supporting tissue can be seen extending like veils into the vitreous from localized areas of retinal elevation. Usually the elevated areas are found near the equator but occasionally may appear in the posterior fundus. In the milder cases only one area of proliferation may occur, but usually there are adjacent areas or perhaps several areas in different portions of the retina. Localized retinal detachment occurs in the periphery of the fundus.

Stage 4: Stage of moderate proliferation

With further progression more of the retina becomes involved. When the proliferation involves half the retina, the disease is said to have reached stage 4. The areas of activity may cover one side of the globe in a hemispheric fashion, or, in some cases, the entire periphery may be involved, producing a detachment around the entire circumference of the retrolental space. During this stage the less severely involved portions of the retina may not be detached, although they may harbor areas of activity.

Stage 5: Stage of advanced proliferation

When the entire retina becomes detached, the disease has reached its most active stage. At this stage, occasionally a massive intraocular hemorrhage occurs, filling the entire vitreous.

Period of regression

When knowledge of the active phase of retrolental fibroplasia was new, the importance of spontaneous regression was not fully appreciated. Even in the early reports on the clinical course of the disease, occasional cases of spontaneous regression had been described. As more infants were studied during the early postnatal period, it became apparent that spontaneous regression was common. It is now known that the incidence of the active phase of the disease is much greater than had been expected from early reports which included only infants with severe residual damage.

Spontaneous regression from the active phase is characteristic of the disease. In the past acute retrolental fibroplasia occurred in about one half of all the premature infants in the lower weight groups. In the infants with active retrolental fibroplasia, spontaneous regression occurred at various stages. In about one third of them, the disease did not progress beyond stage 1. In another quarter of the infants with the active disease, regression occurred before the activity had

proceeded past stage 2. In the remaining infants with active retrolental fibroplasia, stages 3, 4, and 5 were reached before regression occurred (fig. 1).

In the cases with milder degrees of the active disease, recovery occurred with little serious destruction to the ocular tissues, while those cases with more intense activity usually developed extensive residua in the cicatricial phase of the disease. However, there is no certain way of determining during the active phase those cases in which regression will occur without serious destruction of ocular structures.

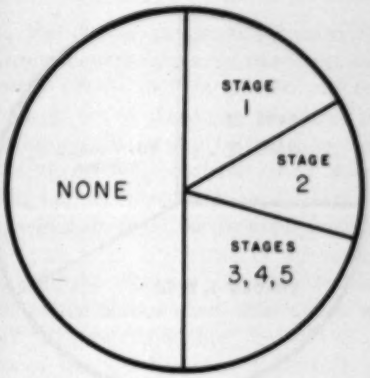

Fig. 1 (Owens). Occurrence of active retrolental fibroplasia.

The cicatricial phase

The extent of residual destruction varies. In some cases, the eyes recover with no clinically visible changes. The others show an entire spectrum of residua extending from small retinal scars to the formation of a completely disorganized retrolental mass. The degrees of residual damage may be divided into five grades.

Grade I: Minor changes

In the less severely affected eyes the fundus may be pale, or a slight decrease in the diameter of the vessels may be noted. Small areas of irregular retinal pigmentation occur, or occasionally a small mass of opaque tissue may be noted in the periphery of the fundus. These eyes are often myopic.

Grade II: Disc distortion

In these cases the disc is pale and the vessels are pulled to one side. On the side opposite from the vessels, a pigment crescent is usually found around the margin of the disc. A small mass of opaque tissue remains in the periphery, toward which the vessels and disc are drawn.

Grade III: Retinal fold

With more severe destruction, a retinal fold is found, extending to a mass of opaque tissue usually lying in the temporal periphery. The retinal vessels are incorporated in the folds. Usually there is only one fold, but occasionally in a single eye several folds are found, each extending to a peripheral mass of scar tissue.

Grade IV: Incomplete retrolental mass

With more extensive destruction, a portion of the retina where proliferation has been marked becomes detached to form a retrolental mass. This may cover only part of the pupillary area. Through the remaining portion of the pupil, a red reflex may be obtained, and occasionally an attached portion of the retina may be seen.

Grade V: Complete retrolental mass

In the eyes that suffer the most severe damage, the entire retrolental space is filled with a mass of fibrous tissue containing the disorganized retina. In the periphery of the pupil elongated ciliary processes can be seen. The anterior chamber is characteristically shallow. Anterior and posterior synechias are usually present. The cornea may become edematous if glaucoma occurs or if extensive anterior synechias form. When an eye is damaged to this degree, its normal growth is inhibited and it remains smaller than normal, giving the appearance of microphthalmos. The upper, and occasionally the

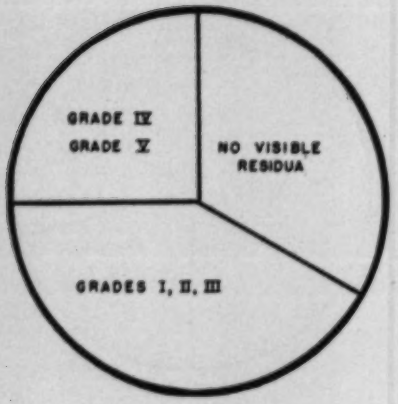

Fig. 2 (Owens). Residua following active retrolental fibroplasia.

lower, lid may be retracted at the palpebral folds. Enophthalmos may be present.

In the past only one quarter of the infants with active retrolental fibroplasia developed partial or complete retrolental membranes (grades IV and V). A third had minor retinal residua or small peripheral masses of tissue with retinal folds or distortions of the disc (grades I, II, III). The remaining infants recovered from the active phase of the disease with no visible residual changes (fig. 2).

Comment

Retrolental fibroplasia usually involves both eyes to the same degree. Occasionally the disease may be more advanced in one eye than the other, but it is rare to find cases with unilateral involvement. The continuous course of retrolental fibroplasia defies strict classification, for one stage blends into another and the clinical manifestations are almost legion. However, a classification of stages in the disease has been useful in spite of the continuous nature of the disease and its variety of clinical forms. The description of steps in the course of the disease aids in the comparison of data accumulated by different investigators in the attempt to determine the cause of retrolental fibroplasia.

Walter Reed Army Hospital.

* * *

PATHOLOGY

Jonas S. Friedenwald, M.D.
Baltimore, Maryland

The histopathology of this disease can, I think, best be understood only in the light of our knowledge of the normal development of the retina. The retina is primarily neural tissue, and in the early embryologic stages this developing organ is devoid of blood vessels. During this period the growing, differentiating structure derives its nourishment from the neighboring choroid and from the hyaloid vascular system of the vitreous.

At the 100-mm. stage capillary buds begin to sprout from the trunks of the hyaloid vessels as they pass through the optic disc. These sprouts invade the retina, spreading slowly peripheralward from the papilla. They are to be found at first mainly in the nerve-fiber layer, and only in the later embryonal stages do vascular loops begin to penetrate the deeper retinal layers. These sprouting capillaries are accompanied by spindle-shaped cells which were formerly thought to be glial in origin but which Ashton has shown are mesenchymal. The vascular proliferation is normally most active in the sixth or seventh months, and it is babies who at premature birth still have their retinal vascularization to be completed that are susceptible to the disease. Evidence that incomplete vascularization of the retina in experimental animals is associated with susceptibility to the disease will be presented by Dr. Patz.

The first recognizable histologic lesion has to do with these sprouting capillaries. Instead of showing their normal growth ex-

tending smoothly throughout the retina, one finds in early stages of retrolental fibroplasia regions of avascularity associated with regions of patchy overgrowth of the retinal capillary endothelium. These patchy overgrowths produce localized whorls of varicose capilliaries resembling the convoluted capillary tuft of a kidney glomerulus. Associated with these glomeru'ar tufts are patches of proliferation of the spindle-shaped mesenchymal cells formerly thought to be glial. Lesions of the type just described are to be seen as early as the second or third week of extra-uterine life and, in rare instances even earlier. Morphologically similar lesions have been found in a few stillborn infants, but the relevance of these lesions to retrolental fibroplasia remains undetermined.

As the disease progresses, hemorrhages and transudations appear in relation to these abnormal vessels, and the vascular proliferation bursts out of the retina. Sheets of proliferating capillaries are often to be found on the vitreal surface of the retina and extending into the vitreous. Retinal detachment results in part from the transudative process, in part from the fibrosis of the vascular strands in the vitreous. The late cicatricial stages of the disease show little that is specifically characteristic, but the fibrotic remains of the so-called glomerular tufts are often still recognizable. These are of special interest to the pathologist because, when present, they may greatly assist in establishing the diagnosis.

The Johns Hopkins Hospital (5).

* * *

PEDIATRIC CONSIDERATIONS

WILLIAM A. SILVERMAN, M.D.*
New York, New York

Comparisons of premature infants, whether for the incidence of retrolental fibroplasia, the death rate, or any other purpose, are hampered by many difficulties. The most important difficulty is that of the range of diversity among these children. Although the accepted definition of a premature is "any new-born whose birth weight is less than 5.5 pounds," it is no exaggeration to say that from the standpoint of death rates a one-pound and a five-pound premature are as different from one another as a 10-year-old and an octogenarian.

The mortality at specific birth weights probably varies insignificantly from one part of the country to another. However, because of different admission policies the nurseries vary in composition, so that comparisons are as difficult to make as they would be between the death rate of a home for orphans and a home for the aged. The largest proportion of deaths that occur among premature infants occurs in the first hours and days following premature delivery, and the death rate quickly declines in the second and succeeding weeks.

The incidence of retrolental fibroplasia has been shown to be related to the degree of prematurity in a manner entirely similar to the death rate, so that geographic and temporal comparisons of the incidence of this disease have been hobbled by these same difficulties of dissimilarity from one nursery to the next.

During the past 20 years survival among premature infants has improved approximately 30 to 50 percent. This fact is too insignificant to account for the increase in blindness among the survivors of premature delivery, which has been estimated to have increased by 500 to 1,000 percent.

It has been shown that the incidence of retrolental fibroplasia has varied from time to time in a manner which could not be ex-

* By invitation.

plained on the basis of differences in the degree of prematurity of infants who are at risk.

From these considerations two basic recommendations can be made which should be followed by any clinical study of this disease. The first is that two or more groups should be compared only if the apportionment of the degree of prematurity is the same or after a suitable correction has been made; and the second is that two groups should be compared only in the same period of elapsed time. This last recommendation should be emphasized because of its particular significance.

If a theory concerning the cause of retrolental fibrosplasia cannot be proven on laboratory animals, then the only alternative is a clinical trial. The hazards of a clinical trial are so well known and so especially applicable to this disease that no re-emphasis should be necessary. If the new theory then is supported by clinical evidence which has been accumulated from the past or by comparison of one nursery or one period of time as opposed to another, then the best that may be said of this support is that it fails to disprove the theory. The argument that consistency of such post-hoc evidence constitutes proof is no more valid than the argument that consistent reports of flying saucers is proof that these objects are substantial.

This negative evidence should not be dismissed as wholly useless, for it is really important to emphasize that from this type of experience an excellent lead may be obtained, but it should not be mistaken as proof in the mathematical sense of the term.

Substantial positive proof, if it is to be dependent wholly upon the clinical trial, must be obtained by testing the theory, by a prospective study, using adequate controls, if it is to be deserving of consideration by exasperated students of this highly variable disease who have already heard too many cries of "wolf."

It is impossible to make any exact statement concerning the incidence of retrolental fibroplasia without the qualification of time and place. It is widely agreed, however, that the disease has increased radically in the past decade. Of prospective studies of incidence published to date, the majority agree that the incidence is related to the degree of prematurity. Both members of a fraternal twinship, and both members of presumably identical twins have been involved. Siblings have been observed with this condition, and the rarity of this event would seem to reflect only the relatively rare occurrence of survival of two or more extremely premature infants born to the same mother.

Examples of retrolental fibroplasia have been seen in individuals of most of the major racial groups, and there have been no consistent sex differences reported.

I should like to discuss briefly some of the physiologic considerations that distinguish prematurely born infants. I must first emphasize, however, that the most severe handicaps of prematurity are life-limiting and among the survivors there is progressive improvement, so that the gap between the premature and the full-term infant is rather quickly closed.

Among other chemical distinctions, fetal hemoglobin differs qualitatively from adult hemoglobin in its unusual ability to take up oxygen at low oxygen pressures. Although the blood of the premature contains relatively more fetal hemog'obin than that of the full-term infant, the order of magnitude is essentially the same—upward of 80 percent. The more striking difference is the slower rate of disappearance in the premature. Fetal hemoglobin is replaced in 16 to 20 weeks in the full-term infant and a longer time is required for conversion in the premature.

The relationship of this fetal hemoglobin to the anemia of prematurity is not clearly defined. There is considerable evidence, however, that normal erythropoiesis is retarded, and this is supposedly the cause of extreme anemia of prematurity. The usual onset times of retrolental fibroplasia are earlier than the times of lowest blood values which are seen among these infants.

Although only widely discrepant figures are available it is generally accepted that umbilical vein blood on its way to the fetus is approximately 50 percent saturated with oxygen, and blood leaving the fetus on its way back to the placenta contains quite low concentrations. This suggests good utilization of available oxygen.

After initial stabilization following premature delivery, only minimal reduction to approximately 90 percent arterial oxygen saturation is seen when these infants are in atmospheric air. Despite this minimal reduction and with no evidence of cyanosis or distress, a high proportion of these infants exhibit irregular or periodic breathing. It was shown about 10 years ago that with increasing oxygen enrichment to 25 percent and up to 85 percent, concentration, increasing numbers of these infants could be made to breathe more regularly, with an increase in the minute volume, and to achieve 100 percent saturation of arterial blood. It was generally accepted that despite minimal clinical signs, marginal anoxia existed, and this was the basis for the pediatric advice in the recent past that prematures remain in oxygen-enriched atmospheres for several weeks after birth.

The body temperature of the premature child is less stable under sudden environmental changes than is that of the child at full term, and the premature remains poikilothermic for a longer period postnatally than the full term. Fat absorption is impaired, and for this reason low fat formulas have been generally, but not exclusively, used during the past decade. High doses, approximately twofold, of vitamin D reflect concern about the proneness of these infants to develop rickets. Vitamin-C supplements are emphasized because of evidence that vitamin C permits the more complete metabolism of certain aromatic amino acids as well as for its antiscorbutic use.

Renal function is impaired because of the morphologic immaturity of the g'omeruli, which constitutes one of the major handicaps of this group of children. These infants excrete hypotonic urine and they have difficulty removing electrolytes from the plasma. However, after the early postnatal days prematures do not frequently exhibit any marked degree of edema while receiving the amount of electrolytes in cow's milk formulas although these formulas contain considerably more electrolytes than does breast milk.

Systemic manifestations of retrolental fibroplasia have not been uniformly reported and associated changes in other organs are denied by most students of this disease.

Studies available on mental measurements, and the largest published series is that of Dr. Samuel P. Hayes of Perkins Institution in Massachusetts, indicate that there is no difference between the retrolental fibroplasia blind and children blind from other causes. Moreover there is no evidence that the incidence of retardation is greater among children with retrolental fibroplasia than among prematures as a whole.

Babies Hospital.

* * *

ETIOLOGY OF RETROLENTAL FIBROPLASIA

PRELIMINARY REPORT OF A CO-OPERATIVE* STUDY OF RETROLENTAL FIBROPLASIA

Prepared by: V. EVERETT KINSEY, PH.D.†
Detroit, Michigan

Assisted by: F. M. HEMPHILL, PH.D.‡
Ann Arbor, Michigan

CO-OPERATING HOSPITALS	INVESTIGATORS
Abington Memorial Hospital Abington, Pennsylvania	Theodore S. Wilder, M. Luther Kauffman, Robert M. Shelly
Baltimore City Hospital Baltimore, Maryland	Harold E. Harrison, David A. Rosen, Laurence Finberg, Carteret Lawrence
Boston Lying-in Hospital Boston, Massachusetts	Clement A. Smith, Julian F. Chisholm, Jr., Stewart H. Clifford, Merrill J. King, Murray E. Pendleton
Cooper Hospital Camden, New Jersey	Vincent Del Duca, Ronald M. Bernardin, Harold D. Barnshaw
Bobs Roberts Memorial Hospital Chicago, Illinois	F. Howell Wright, Arlington C. Krause, Albert Dorfman
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The cause of retolental fibroplasia has been the subject of many investigations since the disease was first described 12 years ago. Few congenital or environmental factors associated with either mother or infant have escaped consideration as possible etiologic agents.[17] Systematic examination of hospital records of mothers of premature infants has failed to bring to light any factors affecting the mother either before or during pregnancy, or at the time of delivery which were consistently related to retrolental fibroplasia. Similar retrospective studies in relation to infants have shown a positive association between the incidence of retrolental fibroplasia and the administration of any of the following: water-miscible vitamins, iron, oxygen,[9] feeding of cow's milk,[6] added electrolytes,[7] and blood transfusions.[5] Experimental evidence has been reported indicating that the administration of alpha-tocopherol reduced the incidence of retrolental fibroplasia, suggesting that the cause of the disease might be a vitamin E deficiency in the infant[13]; other factors which at one time or another have been thought to be associated with retrolental fibroplasia include virus infection,[15] lack of hormones in the infant,[11] premature exposure of the infant's eyes to light,[8, 12] and lack of vitamin A in the mother.[3, 10] All of the factors mentioned above, except the administration of oxygen, have been largely eliminated as likely etiologic agents either through controlled clinical tests or further retrospective examination of records.

Confirmation of the observation that the incidence of retrolental fibroplasia increased with duration of exposure of infants to oxygen was reported from Australia and England by the fall of 1952.[2, 4] The first controlled clinical test which subjected alternate infants to varying amounts of oxygen had just provided strongly suggestive indications that the search for a causative agent for retrolental fibroplasia might be at an end.[14] Early confirmation or denial of these data was urgently needed, especially in view of the bizarre fluctuations in incidence of retrolental fibroplasia noted previously with studies on other factors.[17] This variability of the incidence, both temporally and geographically, indicated the need for skepticism in evaluation of most published investigations. One could anticipate as provocative a discussion from the statement that oxygen was probably a factor in production of retrolental fibroplasia as from one suggesting that it was unrelated to the disease. Moreover, many investigators in the field could recall that the results of administering alpha-tocopherol or cortisone[16] were as striking as those obtained by lessening the exposure to oxygen, but that subsequent work failed to confirm the initial observations. Reported animal experimentation with respect to oxygen in 1952 was as much concerned with the effects of hypoxia as hyperoxia, and the results obtained were either negative or appeared to relate so indirectly to clinical experience as to remain unconvincing.

In the midst of this furor, at the 1952 meeting of the American Academy of Ophthalmology and Otolaryngology the idea of organizing a National Co-operative Study on Retrolental Fibroplasia was conceived. Under the auspices of the National Institute of Neurological Diseases and Blindness of the U. S. Public Health Service, a meeting of ophthalmologists and pediatricians interested in the problem was held in Bethesda, Maryland, to discuss further the advisability of setting up an organization to evaluate on a national scale any promising lead for the solution of the retrolental fibroplasia problem. As a consequence of this, and several

* The Co-operative Study of Retrolental Fibroplasia is being supported in part by a grant from the National Institute for Neurological Diseases and Blindness of the U. S. Public Health Service, Bethesda, Maryland, the National Foundation for Eye Research, Boston, and the National Society for the Prevention of Blindness, New York City.

† From the Kresge Eye Institute.

‡ From the School of Public Health, University of Michigan.

other conferences, investigators from 18 hospitals agreed to pool their nursery facilities and interests, and join in a co-operative study to determine the degree of association between the incidence of retrolental fibroplasia and the administration of oxygen. This investigation anticipated the opportunity of obtaining information of a general nature concerning the premature infant and his parents, which might be helpful not only in interpreting the results with respect to the use of oxygen but in formulating future investigations. Furthermore, this study would also make possible the determination of whether the survival of the premature infant was dependent on the amount of oxygen given him.

Because of the immediate practical importance of the results obtained to date, the steering committee of the Co-operative Study thought it expedient to present a preliminary report of the observations made for the first six months of the investigation, which began July, 1953.

Simply stated, the primary aim of the investigation was to compare the incidence of retrolental fibroplasia in two groups of premature infants, which were to receive oxygen for different periods of time but otherwise would be maintained under as nearly similar conditions as possible. The first group was to receive oxygen in concentrations of over 50 percent for 28 days, a procedure which was then considered essentially routine in view of the degree of prematurity of the infants involved, and a second group which was to receive either no oxygen or limited amounts prescribed only on the basis of clinical urgency. These groups will be referred to as routine and curtailed, respectively. The study was to involve only those infants who survived 48 hours. In order to concentrate efforts on infants where the incidence might be expected to be the highest, only those infants having birth weights of 1,500 grams or less were admitted to the study. Infants within each individual hospital were to be assigned to the groups on a statistically random basis.

In planning this clinical trial, consideration was given to both the possibility that the administration to infants of substantially lesser amounts of oxygen than were customary might significantly increase mortality, and that the continued use of the customary amounts of oxygen might result in an unnecessarily high incidence of the disease.

This Scylla and Charybdis dilemma was resolved by a design in which but one twelfth of the total number of infants expected to be in the study was to be assigned to the routine oxygen group. In this way, should oxygen indeed prove to be positively associated with retrolental fibroplasia, the number of infants in the participating hospitals who would receive routine oxygen during the ensuing year would be substantially less than normal.

To obtain an answer to the questionable role of oxygen as soon as possible, while not materially sacrificing temporal controls, one infant was to be assigned to the routine oxygen group for every two babies assigned to the curtailed oxygen group during the first three months of the study. If at the end of the three-month period there was no difference in mortality, all babies were to be assigned to the curtailed group until such time as the incidence of retrolental fibroplasia in the two groups could be evaluated. This method of allocating infants provided an even greater safeguard with respect to mortality, since at the end of the first three months, a sufficient number of infants would already have been accumulated in each group to permit a decision as to whether the mortality rates were different.

Because the susceptibility of infants to retrolental fibroplasia is thought to vary inversely with their birth weight, assignment of infants to the routine or curtailed groups was made within three weight classifications (1,000 gm. or less, 1,001 to 1,250 gm., and 1,251 to 1,500 gm.). This procedure increased the certainty that the distribution of

susceptibility of the infants in the curtailed and routine oxygen groups would be essentially the same.

The concentration of oxygen was to be measured three times a day after the baby was admitted to the study. The infant receiving routine oxygen was to be returned to an air environment at or after 28 days by reducing the flow rate of oxygen by one third over each of three successive days.

Results

Of the 700 or more infants who were entered in the Co-operative Study during the course of the year, this report will refer only to those who were admitted to the study between July 1, 1953, and January 1, 1954. The data concerning mortality refer to all infants admitted to the study who survived 40 days. Those concerning ocular findings relate to infants whose eyes have been followed for two and a half months or longer, approximately 98 percent of all the infants surviving to this age.

Since all infants assigned to the routine oxygen group were born during the first three months of the study, comparison of the incidence of retrolental fibroplasia in this group should be made only with those infants assigned to the curtailed oxygen group who were born during the same time period if strict temporal control is to be maintained. However, the incidence rates in the curtailed groups during the first three months and the second three months do not differ significantly, so that for the purposes of this preliminary report it seems appropriate to consider all of the infants in the curtailed group during the first six months together. Hence, the data in the tables will refer to infants during the whole six-month period, and presentation of data for each three-month period will be deferred until a complete report is written.

Results of ophthalmologic examination were classified according to numerical evaluation of active and cicatricial grades of retrolental fibroplasia described by Dr. Reese, Dr. King, and Dr. Owens.[1]

Mortality

Of the 68 babies assigned to the routine oxygen group (from age 48 hours), 15 succumbed prior to 40 days, giving rise to a mortality of 22 percent; of the 144 babies in the curtailed oxygen group during the same time period (the first three months only), 36 succumbed, giving a mortality rate of 25 percent (table 1). This difference in mortality rate is not significant as it could be expected to occur by sampling variation. During the first six months 323 babies were assigned to the curtailed group, 65 of whom succumbed, representing an overall mortality of 20 percent in this group. This rate is likewise not significantly different from that found in the routine oxygen group.

The difference in distribution of the infants with respect to the number of days in oxygen is apparent (fig. 1). The average stay in oxygen in the curtailed group was five days compared with an average stay of 30 days in the routine group.

The percentage of infants who developed

TABLE 1

Percentage mortality

	Infants			Percentage Mortality
	Total	Died	Lived	
Routine O_2 group (3 mo.)	68	15	53	22.1
Curtailed O_2 group (1st 3 mo.)	144	36	108	25.0
Curtailed O_2 group (6 mo.)	323	65	258	20.1

Routine O_2 group vs. Curtailed O_2 group (first 3 months) $P = >0.5$.
Routine O_2 group vs. Curtailed O_2 group (6 months) $P = >0.8$.

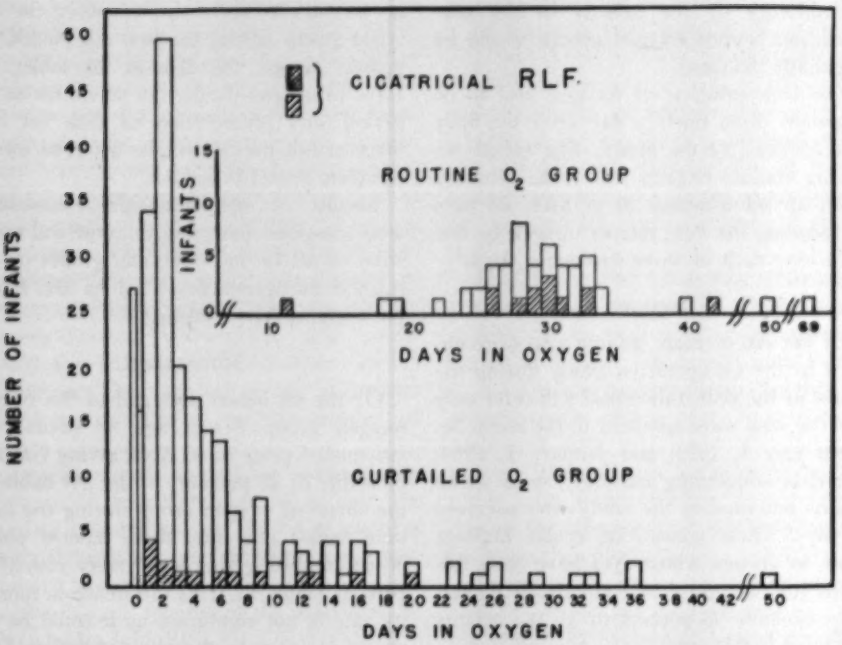

Fig. 1 (Kinsey, et al.). Distribution of the infants according to the number of days in oxygen for the routine and curtailed oxygen groups. The number of infants is shown on the ordinate and the number of days in oxygen on the abcissa. The lower blocks refer to the infants in the curtailed oxygen group, and the inset upper blocks to those in the routine oxygen group. The crosshatched area represents the number of infants whose eyes developed some cicatricial grade of retrolental fibroplasia.

active stages of retrolental fibroplasia where the maximal stage developed in the poorer eye is used as the basis of computation as shown in Table 2. Of the 245 infants in the curtailed oxygen group, 30 percent showed some active stage of retrolental fibroplasia compared with 72 percent of the 53 infants in the routine oxygen group. This difference between the groups is significant at the one-percent level.

Of the 245 infants in the curtailed group 15, or six percent, showed some cicatricial grade of the disease compared with 13 of the 53 infants, or 25 percent, in the routine oxygen group (table 3). Again the incidence of ocular change is significantly greater in the group which received the routine oxygen.

The manner in which the cicatricial cases of retrolental fibroplasia in both the routine and curtailed oxygen groups were distributed with respect to duration of oxygen is shown in Figure 2. Despite the fact that incidence rates of the disease are signifi-

TABLE 2

PERCENTAGE OF INFANTS WHO DEVELOPED ACTIVE STAGE RETROLENTAL FIBROPLASIA
(Maximal stage reached)

Stage	Routine O_2 (3 mo.) (53 infants)	Curtailed O_2 (6 mo.) (245 infants)
	Percent	Percent
Normal	28	70
1	25	15
2	23	8
3	13	5½
4	9	1
5	2	½
Total 1-5	72	30

P = <0.01.

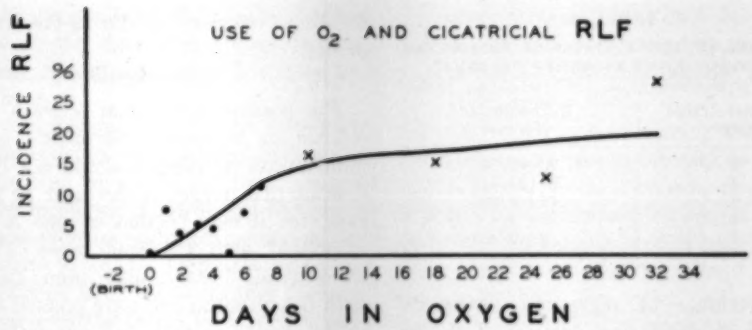

Fig. 2 (Kinsey, et al.). The relation between the incidence of cicatricial retrolental fibroplasia and the number of days the infants were in oxygen after entry into the study. Results of analysis of the data using methods designed to evaluate the effect of cumulative experience are indicated by the curve.

cantly different between the routine and curtailed oxygen groups, some cases of retrolental fibroplasia occurred in infants throughout the whole range of stay in oxygen. The significance of this will be discussed subsequently.

Table 4 shows the distribution of infants in each of three weight groups who developed cicatricial grades of retrolental fibroplasia where the poorer eye is again used as a basis of computation. The table also shows the average number of days in oxygen for each weight group. In this series of cases there was no significant difference in incidence between the three weight groups, or in the amount of oxygen they received. While the number of cases is insufficient to contest effectively the generally held belief that lighter infants are more susceptible to retrolental fibroplasia, they are included here because they provide comparison of the average length of stay in oxygen. Additional data from the Co-operative Study should help clarify this question of possible differences in susceptibility among premature infants *having birth weights of 1,500 gm. or less.*

The percentage of the infants who developed the active stages of the disease but whose eyes eventually showed no cicatricial retrolental fibroplasia is shown in Table 5.

TABLE 3

PERCENTAGE OF INFANTS WHO DEVELOPED CICATRICIAL GRADE RETROLENTAL FIBROPLASIA

Grade	Routine O_2 (3 mo.) (53 infants)	Curtailed O_2 (6 mo.) (245 infants)
	Percent	Percent
Normal	**75.6**	**93.8**
I	5.7	1.6
II	3.8	1.6
III	3.8	0.8
IV	3.8	1.6
V	7.5	0.4
Total I–V	**25.0**	**6.0**

P = <0.01.

TABLE 4

DISTRIBUTION OF CICATRICIAL GRADES OF RETROLENTAL FIBROPLASIA, AND AVERAGE NUMBER OF DAYS IN OXYGEN BY WEIGHT GROUP

Weight Group Gm.	Average No. Days in Oxygen	Normal	Retrolental Fibroplasia	Percent with Retrolental Fibroplasia
1000 or less	12	31	2	6
1001–1250	14	90	13	14
1251–1500	10	149	13	9

TABLE 5

PERCENTAGE OF ACTIVE STAGES OF RETROLENTAL FIBROPLASIA WHICH REGRESSED TO NORMAL

Maximal Active Stage	Regression to Normal
1	90 (45/50)
2	87 (27/31)
3	45 (9/20)
4	25 (2/8)
5	0 (0/2)

The percentage of regression clearly decreases with increasing severity of the active phase. The observation that the eyes of nine tenths of the infants reaching active stages 1 or 2, and approximately one half of those reaching stage 3 regressed to normal indicated the favorable prognosis during the early stages of retrolental fibroplasia.

The relation between the incidence of cicatricial retrolental fibroplasia and the number of days the infants were in oxygen after entry into the study (age 48 hours), was computed for all the infants, independent of the group to which the infants were assigned by protocol (fig. 2). The incidence of retrolental fibroplasia for the first week was computed on a daily basis (filled circles), but because of the lesser number of infants whose exposure exceeded one week, the incidence thereafter was calculated on a weekly basis (crosses). With few exceptions the exposure to oxygen occurred immediately upon entry into the study, and the incidence of retrolental fibroplasia was zero in those infants who received no oxygen after entry into the study. There were 43 infants in this group. Thereafter, the risk of developing retrolental fibroplasia appeared in this analysis to increase with exposure to oxygen during the first 10 days of life. This preliminary observation is similar to results obtained in animal experimentation and may prove to be of considerable importance. It suggests, first, that the mechanism involved is of the type of an all or none insult to the eye which is associated with relatively short exposure to oxygen in the early days of life, and, secondly, the necessity of restricting the use of oxygen even during the first week of life.

DISCUSSION

The positive association between the incidence of retrolental fibroplasia and administration of oxygen would not in itself indicate that oxygen is the cause of the disease, for it may be that oxygen is simply associated with the true cause. Previous investigators[18] have also been concerned with this problem and have pointed out that while oxygen therapy and retrolental fibroplasia are related to each other, they may both be dependent upon such common factors as illness or birth weight.

The random assignment of infants proportionately by birth weight to the two types of oxygen regimens in this study, and the subsequent finding of significant differences in incidence of retrolental fibroplasia, indicate that weight at birth did not seem to be a controlling influence in development of the disease, and, similarly, illness is not likely to be the controlling influence because the number of babies who might be expected to become ill should be the same in both groups. However, it is possible that other unrevealed factors associated with oxygen therapy may, either alone or together with oxygen, produce the disease.

The study was designed primarily to evaluate the effect of duration of exposure of the infants to oxygen with regard to the incidence of retrolental fibroplasia. However, data collected from the study allow a certain amount of analysis of the effect of concentration. For example, the average concentration of oxygen to which the infants were exposed during the first nine days was 53 percent in those cases developing either active or cicatricial retrolental fibroplasia, whereas the average concentration for those infants whose eyes were normal was 47 percent. This suggests that there may be a critical concentration beyond which the risk of retrolental fibroplasia rises rapidly, or, conversely stated, the use of oxygen below certain minimal concentrations may involve

less risk of retrolental fibroplasia. Further analysis of the data with regard to concentration is contemplated and will be reported later.

The observations reported in this study bear indirectly on the question of slow or rapid weaning of the infant from oxygen. Since the incidence of retrolental fibroplasia appears to increase with each additional day of exposure to oxygen during the first week or 10 days of life, it follows that prolonging the stay of the infant in oxygen to permit slow weaning may increase the risk of developing the disease. Further analysis of the data when they become available may make it possible to evaluate the relative risks involved.

Summary and Conclusions

Hypotheses of the etiology of retrolental fibroplasia, other than those concerned with the use of oxygen, have failed to receive confirmation. Retrospective studies initially suggested that the incidence of the disease was correlated with exposure of the premature infant to oxygen. A study using alternate controls provided more convincing evidence of the relation between the use of oxygen and retrolental fibroplasia.

A national Co-operative Study involving 18 hospitals was designated to evaluate quickly in a controlled clinical trial not only the association between the use of oxygen and the incidence of the disease but the mortality risk involved in the use of drastically curtailed amounts of oxygen.

Premature infants who weighed three pounds and five ounces, or less, at birth and who survived 48 hours were randomly assigned to one of the following two regimens of oxygen administration:

1. A routine oxygen group which received approximately 28 days of oxygen at concentrations of at least 50 percent.
2. A curtailed oxygen group which received oxygen only on the basis of frank clinical need.

All other conditions concerning the care of the infants were kept as constant as possible.

This report which, it must be emphasized, is only of a preliminary nature, shows that there was no significant difference in mortality of infants in the two groups. The incidence of both the active and cicatricial forms of retrolental fibroplasia, however, was significantly higher in the group which received routine oxygen.

The incidence of the cicatricial form of retrolental fibroplasia has thus far been found to increase with the duration of exposure of the infants to oxygen during the first 10 days after entry in the study, but to increase little more with additional exposure. These observations suggest that some initial insult occurs to the eyes which is associated with relatively short exposures to oxygen.

The data indicate that (1) limiting the amount of oxygen used in the care of premature infants to that required for clinical emergency is without effect on the survival rate of the infants; (2) the incidence of retrolental fibroplasia is positively associated with the use of oxygen; and (3) much of the deleterious effect appears to be associated with exposure to oxygen within the first 10 days of life.

Therefore, it is concluded that pediatricians should restrict the use of oxygen to those minimal amounts which on the basis of frank clinical need are required for the survival of the infant. The investigators responsible for this study hope that its continuation during the current year may establish relatively safe levels for such oxygen therapy.

690 Mullett Street (26).

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* * *

EXPERIMENTAL STUDIES*

ARNALL PATZ, M.D.
Baltimore, Maryland

The first attempts to reproduce retrolental fibroplasia in animals were made originally by Terry,[17] who conducted experiments on pouch opossums and newborn rats with measures calculated to cause precocious closure of the hyaloid artery. Dr. Terry did not elaborate on the techniques of his experiments; however, he concluded that the results were completely negative.

Hepner[10] reported the producion of a condition similar to retrolental fibroplasia in kittens. Here newborn kittens were given enormous quantities of fluids with high electrolyte content and large blood transfusions until the animals were completely waterlogged with massive edema. Hepner's lesions, however, consisted only of dilatation

* From the Departments of Ophthalmology and Pediatrics, District of Columbia General Hospital, and the Hoffberger Research Laboratories, Sinai Hospital, Baltimore, Maryland. These studies were aided by grants from the National Institute of Neurological Diseases and Blindness, Public Health Service, and the National Society for the Prevention of Blindness.

of the retinal vessels with areas of retinal edema. It is apparent that the retina here simply participated in the generalized edema. The extraretinal vascular proliferative changes of the disease were not observed. Hepner's experiments, however, raise the possibility that high electrolyte feedings in infants might increase the tendency for retinal edema in retrolental fibroplasia.

Callison and Orent-Keiles[3] reported intraocular hemorrhages and disturbance of the vitreous, suggesting retrolental fibroplasia, in vitamin-E deficient young rats. Working with Callison in her own laboratory and using the identical technique that she reported, we have been unable to reproduce the lesions that were originally described.[15]

Ingalls and co-workers[11] observed fetal anomalies in a very small percentage of mice exposed to an anoxic environment in utero. These changes consisted primarily of hyaloid system abnormalities and the experiments were conducted considerably before retinal vascularization had started. It is, therefore, doubtful that these lesions can be related to classic human retrolental fibroplasia.

Campbell[4] using rats, Ashton[1] kittens, and our group[14] mice and rats, have observed that an anoxic environment causes a slightly abnormal pattern of retinal vascularization with a denser than normal capillary network and narrowing of the capillary-free zone about the arterioles. Typical vasoproliferations of retrolental fibroplasia erupting into the vitreous were not detected. These data combined with studies on high oxygen implicate a relative oxygen lack in the retina as an important stimulus to vascularization.

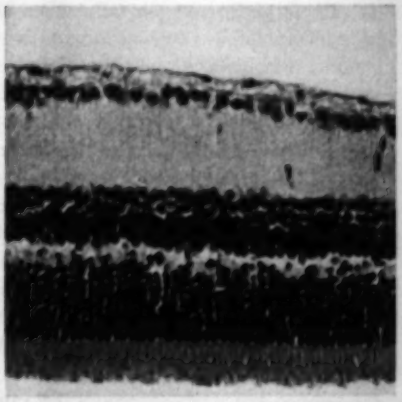

Fig. 1 (Patz). Cross section of retina of normal 21-day-old mouse. Note relatively acellular character of nerve-fiber layer. (Hematoxylin-eosin, ×400.)

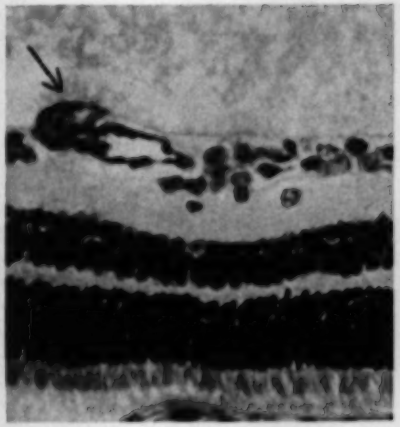

Fig. 2 (Patz). Section of retina of 21-day-old mouse raised in 70-percent oxygen since first week of life. Arrow points to abnormal proliferating endothelial nodule in the nerve-fiber layer. (Hematoxylin-eosin, ×400.)

There are now available experimental studies on high oxygen administration from three independent laboratories. Gyllensten and Hellström[7] in Stockholm observed intermittent intraocular hemorrhages, vitreous degeneration, and abnormal proliferation of the hyaloid vessels in mice exposed to 100-percent oxygen. In a later publication[8] they cite the typical vascular proliferative lesions of retrolental fibroplasia. Ashton and co-workers,[1, 2] in carefully conducted experiments on kittens, have observed the characteristic retinal vascular lesions described in human retrolental fibroplasia and have contributed greatly to our understanding of the mechanism of oxygen action in retrolental fibroplasia. In our own laboratory, experi-

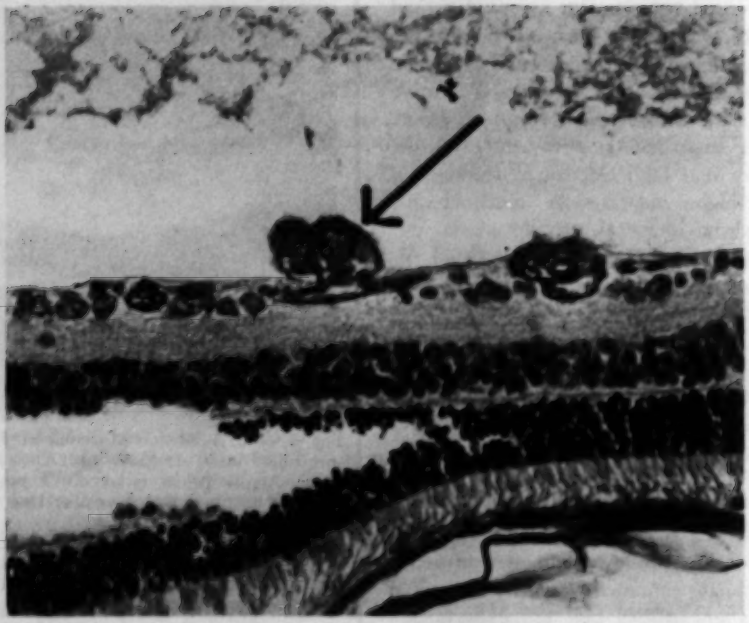

Fig. 3 (Patz). Section of retina of 21-day-old rat raised in 70-percent oxygen since first week of life. Arrow points to abnormal proliferating endothelial nodule in the nerve-fiber layer. (Hematoxylin-eosin, ×400.)

ments on the ocular and systemic effect of high oxygen were instituted to parallel a controlled nursery study that was in progress in our hospital. When newborn or young mice, rats, kitten, and puppies were exposed to high oxygen, lesions typical of early human retrolental fibroplasia were observed[6, 9, 16] (figs. 1-8).

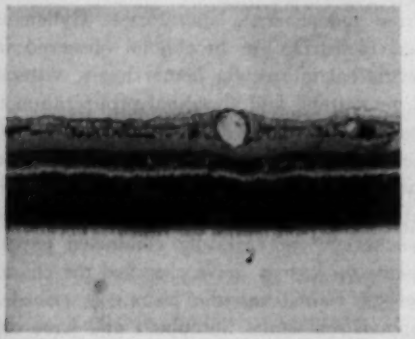

Fig. 4 (Patz). Cross section of retina of normal 21-day-old kitten injected with India ink. Note that capillaries are confined to the retina. (Hematoxylin-eosin, ×300.)

The common factor fundamental to all these animal experiments is that the animal's eye is susceptible to oxygen only when the retina is incompletely vascularized and is resistant once vascularization is complete.

Figure 9 shows schematically the chronology of retinal vessel maturation in the human fetus based on the data of Mann and Michelson. The retinal vessels leave the disc at approximately four months' gestation and reach the ora serrata at approximately eight months. It is a fortunate circumstance that in the experimental animals studied, many full-term newborn animals have an incompletely vascularized retina. For example, the newborn kitten or puppy and the four-day-old rat retinas are vascularized to the same degree as a seven-month human fetus.

Extensive examinations of all other organs in mice, rats, and kittens have failed

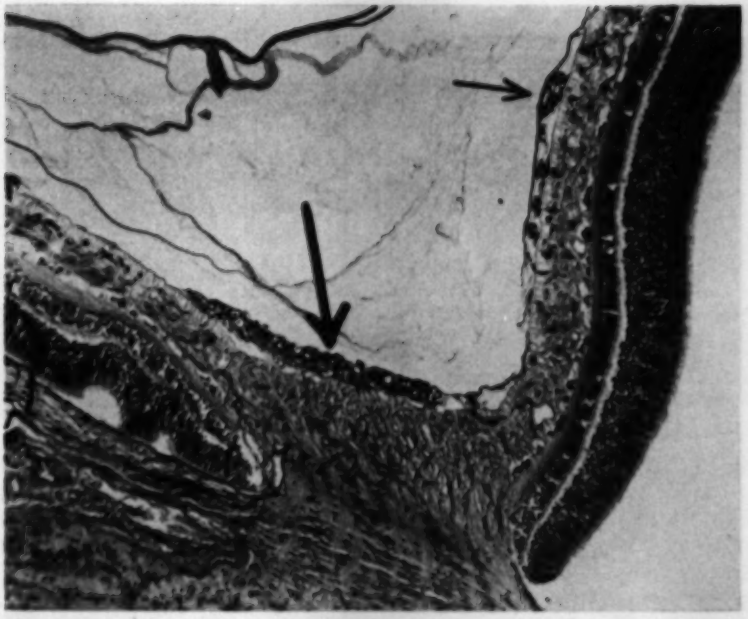

Fig. 5 (Patz). Section of retina of 28-day-old kitten. The animal was raised in 70-percent continuous oxygen from the second day after birth. The small arrow points to abnormal proliferating capillary buds on the surface of the retina. The large arrow indicates a neovascular membrane over the optic nerve. (Hematoxylin-eosin, ×100.)

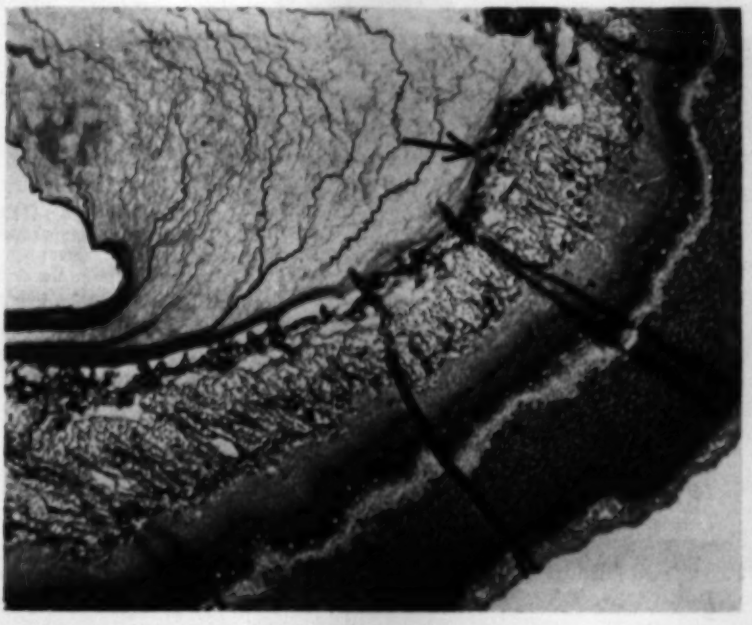

Fig. 6 (Patz). Cross section of eye of 21-day-old kitten that received oxygen for the first week of life. Note capillary growth on vitreal surface of the retina. (Hematoxylin-eosin, ×100.)

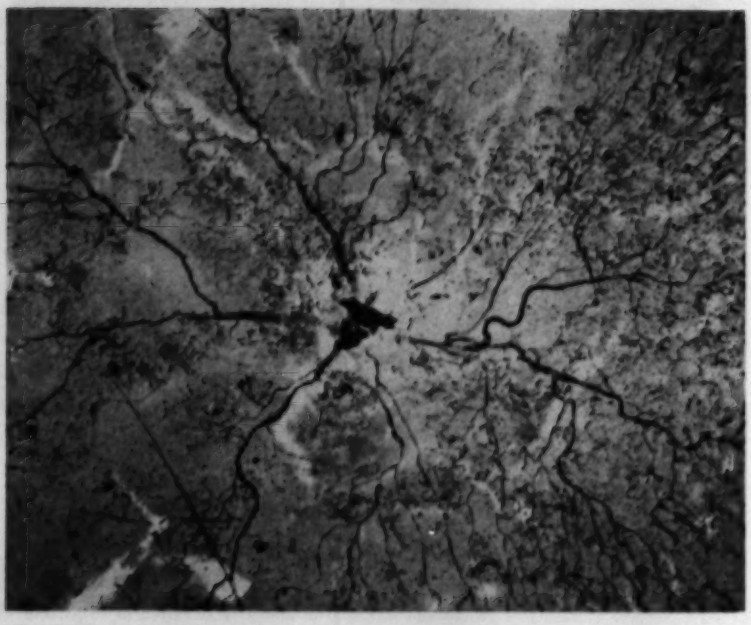

Fig. 7 (Patz). Flat retina preparation from a 33-day-old kitten exposed to 70-percent oxygen for the first week of life, then removed to room air. Note the abnormal pattern of retinal capillaries, with numerous formations near the disc. (Unstained preparation, ×20.)

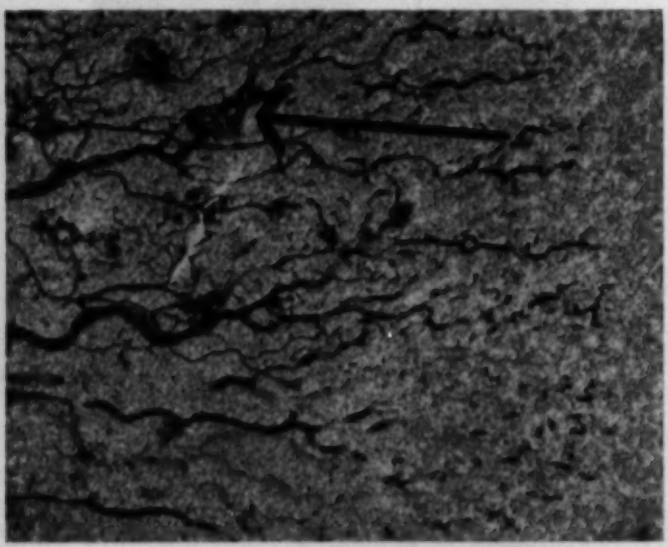

Fig. 8 (Patz). Flat retina preparations, showing abnormal capillary tufts at the periphery of vascularization. Note the avascular zone distal to the retinal vessels. (India-ink injected, 26-day-old kitten, ×50.)

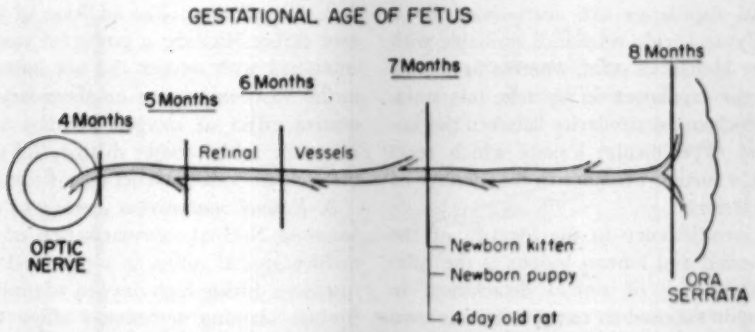

Fig. 9 (Patz). Schematic drawing, showing chronology of retinal vascularization in the human fetus. The retinal vessels advance from the disc to the ora serrata between the fourth and eighth month of gestation. The relationship to retinal-vessel development in the rat, cat, and dog is indicated.

to reveal changes produced by oxygen in other organs, except for occasional pulmonary edema on prolonged exposure.

The retinal response to oxygen in the animals studied in our laboratory is not only dependent upon an immature retinal vasculature, but is inversely proportional to the degree of vascularization of the retina (fig. 10). On the basis of these animal observations, the incidence of retrolental fibroplasia in our premature nursery was reviewed on the basis of gestational age as an index to maturation of the retinal vessels.

A strikingly similar correlation between growth of retinal vessels and retrolental fibroplasia incidence was noted and gives additional support to the evidence that the oxygen-induced experimental lesions are probably analogous to early human retrolental fibroplasia.

Dr. Friedenwald[8] has already pointed out that in human retrolental fibroplasia, the

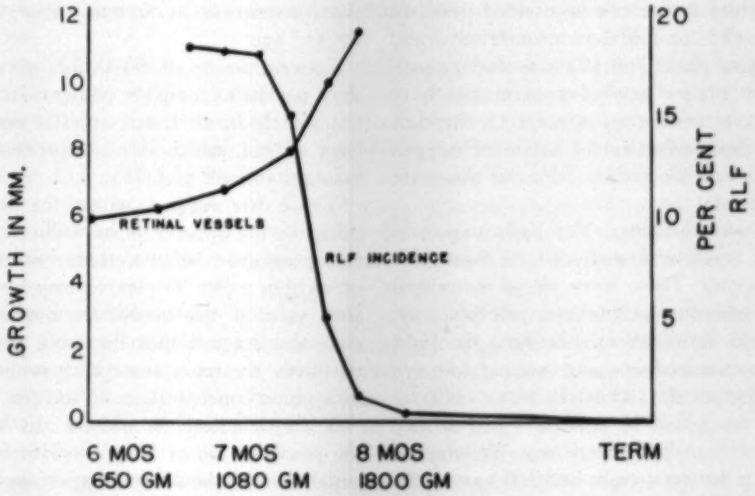

Fig. 10 (Patz). This chart shows the correlation between the incidence of retrolental fibroplasia and the degree of maturation of the retinal vessels based on gestational age. (Nursery data collected between July, 1948, and December, 1950.)

abnormal capillaries are surrounded by a mucopolysaccharide substance stainable with Schiff or Hotchkiss stain, whereas in normal infants the capillaries do not take this stain. The histochemical similarity between the human and experimental lesions which react alike adds further evidence to the identity of the two lesions.

One inconsistency in the identity of the experimental and human lesions is the relative infrequency of retinal detachment in the animals exposed to oxygen. In our own laboratory the characteristic early proliferative changes of retrolental fibroplasia have been produced in several hundred animals. Most of these have included mice and rats where detachment might not be expected, as the lens, by its relatively large size, would tend to support the retina in its normal position. In only two puppies of 20 studied has detachment of the retina resulted from oxygen exposure. Here extensive hemorrhage into the vitreous preceded the retinal detachment. In approximately 100 kittens exposed to an increased oxygen environment, retinal detachment was not observed.

The effects of oxygen on the incompletely vascularized retina can be divided into two phases: (1) an initial vasoconstrictive and obliterative phase and (2) a secondary proliferative phase. Several experiments have been performed in an attempt to elucidate further the mechanism of action of oxygen on the immature retina. Some of these are briefly cited:

1. *Sympathectomy.* The right vagosympathetic trunk was sectioned in four newborn puppies. These were placed in oxygen at 70-percent concentration continuously. There was no differentce between the right sympathectomized eye and normal left eye in the degree of vasconstriction or obliteration in the retina in animals killed at two days and five days; there was likewise no difference between right and left eye in degree and pattern of abnormal secondary vasoproliferation in the 15-day-old and 21-day-old puppies.

2. *Vasodilators.* The addition of five-percent carbon dioxide, a powerful vasodilator, combined with oxygen did not influence the initial vasoconstrictive or secondary proliferative effect of oxygen in mice and rats. Nicotinic acid, another dilator, did not alter the retinal vasoconstriction of oxygen.

3. *Retinal maturation during oxygen inhalation.* Normal vascularization of the immature animal retina is suppressed in most instances during high oxygen administration. Special staining techniques show that the nonvascular elements, however, are not visibly affected and differentiation continues. As a result, the normal channels of vascularization are possibly filled in by other elements during oxygen exposure. When vascularization is ultimately activated, the new vessels, lacking their normal channels, apparently erupt through the internal limiting membrane into the vitreous.

4. *Concentration of oxygen.* In the rat, oxygen concentrations under 40 percent do not appreciably constrict or obliterate the retinal vessels at any age. From birth to four days of age, 40 to 55-percent oxygen causes advanced vasoconstriction with minimal vasoconstriction in animals four to eight days of age.

Concentrations of 60 to 70 percent produce partial to complete obliteration of retinal vessels in all tested animals under five days of age, which is more pronounced in younger animals (fig. 11).

These data suggest, within the limits imposed by the differences in newborn animals and premature infants, that concentrations of oxygen under 40 percent may be reasonably safe in the premature nursery. The data also suggest that the more premature the birth, the more susceptible is the infant to a given concentration of oxygen.

5. *Experiments on anoxia.* In view of the possible role of *simple anoxia* in retrolental fibroplasia several experiments were performed. Newborn mice and rats were raised to 21 days of age in oxygen concentrations measuring between 10 and 14 per-

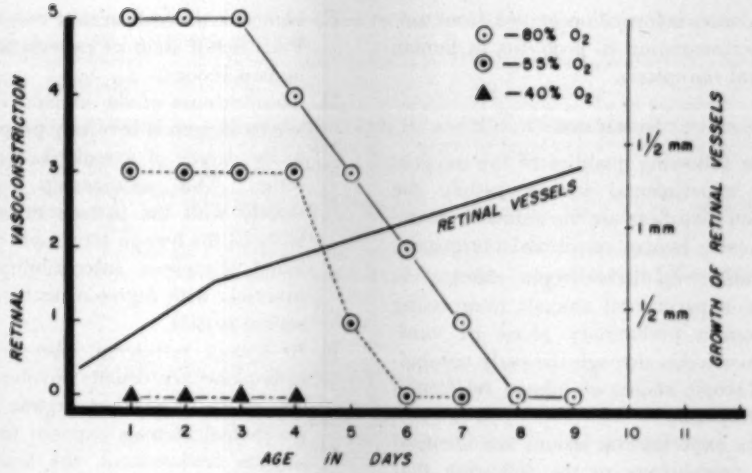

Fig. 11 (Patz). Susceptibility to oxygen at various concentrations, showing correlation with maturation of retinal vessels in the rat.

cent. The mortality rate at these low oxygen tensions was approximately 50 percent. In those surviving animals the capillary-free zone around the retinal arterioles was slightly narrowed, but the vessels were perfectly normal in cross section; no endothelial nodules were noted, and in no instance did the vessels erupt from the retina into the vitreous.

In their preliminary report Ashton and co-workers[1] had suggested that exposure to a lowered oxygen environment might produce retrolental fibroplasia lesions experimentally. On extending their experiments, however, they have reported[2] that retinal vessel proliferation into the vitreous did *not* occur on exposure to low oxygen tensions. These experimental data from both Ashton's and our own laboratory indicate that a *lowered* oxygen environment, even at levels where many premature infants would probably not survive, is inadequate to produce the classic retrolental fibroplasia lesions experimentally.

It can be concluded that the marked vasoconstriction produced by oxygen in the immature retinal vessels is markedly exaggerated when compared to the slight constrictive effect on mature retinal vessels, or on vessels in other organs. Where the oxygen exposure is of short duration, the vasoconstriction is reversible on removal to room air. Where the oxygen exposure lasts for three to four days or longer, the vasoconstriction is irreversible and a true obliteration of the vessels results. Ashton and coworkers[1] were the first to differentiate the simple vasconstriction from temporary exposure to oxygen from the true obliteration after a prolonged exposure to oxygen, an observation which has been amply confirmed in our own laboratory. Their observations with anticoagulants suggest that the obliteration results from an adhesion of opposing endothelium of the vessels or from intravascular clotting.[2]

The experimental production of lesions closely resembling retrolental fibroplasia in animals raises many questions concerning the effects of oxygen on the immature retina. Working hypotheses[2, 12, 13] have been ventured to explain many of the observed phenomena, but these are beyond the scope of this report. The striking similarities between the experimental and human lesions should permit us to apply, with a reasonable degree

of confidence, information gained from animal experimentation to problems in human retrolental fibroplasia.

Summary

I. The following qualities of the oxygen-induced experimental lesions justify the conclusion that these are the animal counterpart of early human retrolental fibroplasia:

A. Similar ophthalmoscopic changes in the experimental animals progressing from a preliminary phase of vasoconstriction through the early ophthalmoscopic stages of human retrolental fibroplasia.

B. The experimental lesions are identical in morphology to the following that are observed microscopically in the human disease:

1. Endothelial nodules in the nerve-fiber layer of retina.
2. Proliferation of retinal capillaries through the internal limiting membrane into the vitreous.
3. Formation of glomerularlike capillary tufts.
4. Vitreous disorganization.
5. Retinal and preretinal hemorrhages.
6. Retinal edema.

C. Identical histochemical response to PAS Schiff stain of experimental and human lesions.

D. The response of the immature animal eye to oxygen is inversely proportional to the degree of vascularization of the retina. This relationship correlates closely with the pattern of susceptibility of the human retina where retrolental fibroplasia susceptibility varies inversely with degree of maturation of retinal vessels.

E. In human retrolental fibroplasia, the eyes alone are usually involved without changes in other organs. In experimental animals exposed to a high oxygen environment, the lesions are limited to the eyes.

II. The experimental observations support the clinical impression that oxygen administration is intimately associated with retrolental fibroplasia development.

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Addendum

Gerschman and co-workers (Am. J. Physiol. **179**:115-118 [Oct.] 1954) have reported on independent studies on the effect of oxygen administration on the eyes of new-born mice. The lesions described conform closely to those herein illustrated.

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MANAGEMENT

FREDERICK C. BLODI, M.D.
Iowa City, Iowa

The management of retrolental fibroplasia is still only a palliative one. However, pediatricians and ophthalmologists should be acquainted with the various problems that may arise during the course of this condition. They may not always be able to cope with them, but they may frequently alleviate them. They should be able to reassure the parents, to counsel them as to prognosis and final outcome of the disease, and to advise them as to further educational aid and social adjustment in the case of severe visual impairment of the child.

THE ACTIVE PHASE

In order to detect active cases of retrolental fibroplasia, premature children have to be examined as early in life as possible. It is usually feasible to examine a baby during the first week of life. In order to detect the exact onset of the disease and follow its development closely the infant should be seen once a week.

Good dilatation of the pupils is absolutely necessary for a satisfactory examination of the fundi. One drop of a two-percent homatropine hydrobromide solution and one drop of a 10-percent phenylephrine (Neosynrine®) hydrochloride suspension are instilled into each eye. The phenylephrine occasionally causes blanching of the conjunctiva and lids in very small babies. The dilatation of the pupils is adequate after an hour even if the iris is heavily pigmented. Only in a very few affected children is dilatation unsatisfactory after these mydriatics. Atropine should be avoided in small children.

For the examination itself, the baby is taken out of the incubator, put on a table, and immobilized. This is easily achieved by wrapping the child in a blanket. Ophthalmoscopic examination is possible with the infant in an incubator, but is thus done only when the condition of the baby is precarious. The examiner stands at the baby's head and opens the lids with his fingers or instructs a nurse to pull down the lower lid as he raises the upper lid. The nurse stands at the infant's feet and grips the head firmly. In this way a satisfactory examination in the large majority of smaller infants is possible. Only larger or restless babies need to be pacified with a moistened, sterile sugar teat.* The sugar teat is generally effective in placating the baby up to the age of four months, after which he is less tractable and it becomes necessary to use a general anesthetic in indicated cases.

The fundus of a small premature child

* About one-third of a teaspoon of cane sugar is put in the middle of a sterile two by two inch sponge and then tied with a piece of thread.

may in the beginning be obscured by a vitreous haze or clouding. Only some of the vessels may be faintly visible. The disc is often grayish or whitish in color. It may be best visible with a high myopic lens. As the eye matures, or in larger premature children, the vitreous clears and only remnants of the hyaloid system remain present. These also disappear quickly. The extreme periphery of the fundus has a characteristic, homogeneous gray color and appears elevated. This grayish peripheral zone persists for a considerable period of time and should not be confused with the peripheral changes in early retrolental fibroplasia.

The ophthalmoscopic examination should not be confined to the posterior segment, but should include the periphery, where the first pathologic changes may appear. It is usually possible to rotate the child's eye in any direction desired by exerting gentle pressure with the fingers holding the lids.

Infants with normal fundi are not followed after the age of three months. When the patient is discharged before that age, ophthalmoscopic examinations are made every two weeks in a follow-up clinic, the same technique being employed.

If retrolental fibroplasia is suspected or detected during one of these routine examinations, the baby should be followed more closely. It may be necessary to examine the child twice or three times a week in order to appreciate various progressions or regressions during the course of the disease. Only when the disease has progressed to a more severe stage should the parents be informed and instructed. It means unnecessary anxiety and worry for the whole family if they are informed about the child's condition at an earlier stage of the disease when the chances of a spontaneous regression are so great.

In the severe stages of the active phase the pupil should be intermittently or continuously dilated to avoid posterior synechias.

The cicatricial phase

When the active phase is over and the disease has run its course, the management of the case will depend upon the degree of severity into which the disease has developed. The prognosis for the milder cases is excellent and we can only assure the parents that the condition will usually remain stationary.

Severe cases should be followed at regular intervals. This should be every six months the first two years and then yearly. These later examinations serve mainly as a check on the development of possible complications. They also give the parents an opportunity to discuss with the physician any problems and difficulties which have come up during the preceding year.

Medical treatment of these severe cicatricial stages is of no avail. Surgery, irradiation, and other therapeutic methods have been tried, but all these attempts have proven unsuccessful.

The remaining vision will depend on the severity of the case. Eyes affected with retrolental fibroplasia of Grade IV or V will have only light perception. In Grade III vision is 3/200 to 10/200 when the fold is on the temporal side. It may be better when the fold does not cross the macular area. In these severe cases fixation will develop later than normally and a roaming nystagmus may persist for a long period of time.

Complications

The most frequent complication of retrolental fibroplasia is secondary glaucoma. It develops in a fourth to a third of all severe cases. It is probably caused by an obstruction to the outflow of aqueous when the anterior chamber becomes increasingly shallow. Frequently the rise in intraocular pressure is brief and does not cause much discomfort to the child. Occasionally, however, the rise in pressure may be acute and cause severe distress to the infant.

Glaucoma usually arises in eyes which are

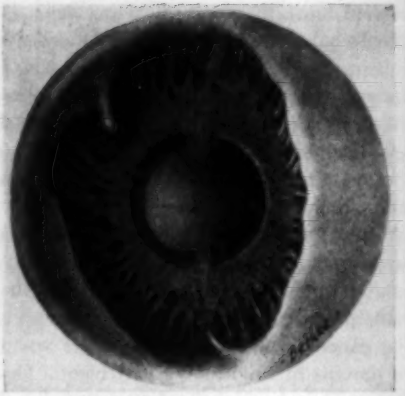

Fig. 1 (Blodi). Peripheral corneal opacities caused by anterior synechias.

blind, and therefore no treatment is indicated except when pain and other general symptoms occur. This type of glaucoma may be controlled by miotics and the pressure will be normal after a few days or weeks. In a few cases it may be necessary to perform an operation to relieve the glaucoma if medical treatment alone does not suffice. However, the opening of an eyeball in such a patient may be followed by disastrous complications.

Few of the glaucomatous eyes in these children become buphthalmic as the glaucoma is usually of a transitory nature. Shallowing of the anterior chamber during a period of increased intraocular pressure may be followed by a deepening of the anterior chamber when the eye becomes atrophic.

Fig. 3 (Blodi). Deep-set eyes in severe retrolental fibroplasia.

Another frequent complication of severe retrolental fibroplasia is a corneal opacification. It is caused by anterior synechias and may present a cosmetic problem (figs. 1 and 2).

Another cosmetic problem is the smallness of the eye, deep set in the orbits, as enophthalmos occurs often in severely affected eyes (figs. 3 and 4). If the eye is completely blind it can be managed like any other atrophic eye.

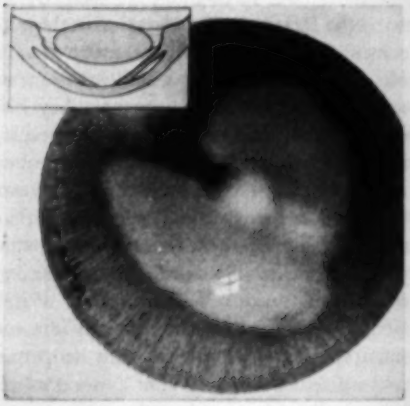

Fig. 2 (Blodi). Central corneal opacities caused by anterior synechias.

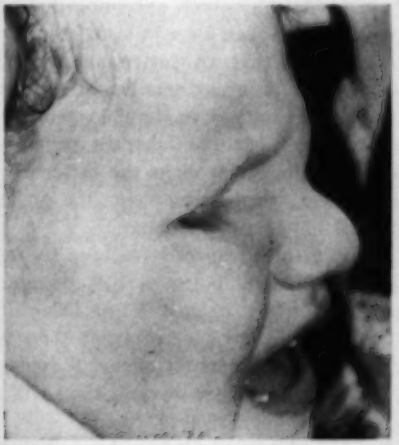

Fig. 4 (Blodi). Lateral view of deep-set eyes in severe retrolental fibroplasia.

A retinal fold (partial retinal detachment) that is seen in the cicatricial phase of the disease usually does not progress. Such an eye may deviate, thus enabling the patient to use an attached part of the retina for fixation.

Esotropia of the more amblyopic eye is a common complication. It can be surgically corrected for cosmetic reasons. This should not be done when the deviation brings a functioning area of the retina into the line of fixation.

Cataract develops only in about three percent of eyes affected with Stage IV or V. It is therefore an uncommon complication of this disease.

Educational and social adjustment

As long as no effective treatment for retrolental fibroplasia is available these patients will present an educational and social problem more than a medical problem. The parents have to be guided in their endeavor to bring up a visually handicapped child. Many agencies and trained social workers will be able to give help to them, but the first responsibility lies with the physician who makes the diagnosis and informs the parents about the poor prognosis.

While the physician has to discuss with the parents many medical problems of retrolental fibroplasia, he will have to refer them to the proper agency for further counseling. The panel has prepared a pamphlet written for parents of children with retrolental fibroplasia. This booklet is distributed by the physician and it should bridge the gap between the physician and the social worker. It will enlighten the parents about many problems of the disease.

University Hospitals.

* * *

CONCLUSIONS

Algernon B. Reese, M.D.
New York, New York

All theories concerned with the etiology of retrolental fibroplasia excepting that concerned with oxygen have failed of confirmation. We feel that we can recommend with confidence a program entailing a more rational use of oxygen in the management of the premature infant and that we may anticipate a significant drop in the incidence of this disease, which has become the greatest cause of blindness in children.

While great advances have been made in the better understanding of the etiology of retrolental fibroplasia, it is probable that even with judicious use of oxygen there will be occasional cases of retrolental fibroplasia. It is hoped that future investigations will reveal other etiologic factors.

It must be remembered, however, that use of oxygen is sometimes a life-saving measure, and it will be necessary to continue its use for infants with cyanosis and definite signs of respiratory distress.

Pediatricians throughout the country are taking the facts into consideration in the management of newly born prematures. The indications for oxygen administration are now considered to be fewer than they have been in the recent past. Cyanosis and respiratory distress are held to be bona fide symptoms requiring oxygen therapy. However, there is a growing conviction that irregular or periodic respirations unaccompanied by other signs of distress do not require oxygen administration. When oxygen is indicated, every effort is made to keep the concentration in the incubator below 40 percent and to discontinue treatment as soon as respiratory distress is relieved.

We feel that there is insufficient evidence available to support the idea that retrolental

fibroplasia is benefited by oxygen therapy.

The panel feels also that there is insufficient evidence available to warrant a statement that the rate of withdrawal affects the ultimate outcome of the disease. Controlled animal experimentation should help clarify this important issue.

The remarkable similarity between the oxygen-induced experimental lesions and the lesions of early human retrolental fibroplasia suggest that the true counterpart of human retrolental fibroplasia has been produced. Because of the close identity of the animal and early human lesions, data obtained from animal experiments can be applied with reasonable confidence to problems in human retrolental fibroplasia. One inconsistency, however, is the infrequency of retinal detachment in the oxygen-treated animals. The data presented show that the common denominator in all the animal experiments is a susceptibility to oxygen where the retina is incompletely vascularized and a resistance to oxygen damage where vascularization is complete.

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* * *

DISCUSSION

QUESTION: *How do you correlate Stage I of vasodilatation with the vasospasm of the experimental animal?*

DR. PATZ: I think the vasospasm seen in experimental animals can be correlated to a certain extent with observations in the clinical disease. During the first year of our controlled nursery study, four of seven infants in oxygen at concentrations of 60 to 70 percent showed marked vasoconstriction and obliteration prior to the appearance of vasodilatation. This was a casual observation and we were unaware of its real significance.

During the second year of the study, we looked particularly for this change, and all five cases in high oxygen that developed terminal membranes progressed through an initial stage of marked attenuation or obliteration of their retinal vessels prior to dilatation.

It is important to point out that these infants received oxygen at 60 to 70 percent concentrations. I think probably at lower oxygen concentrations the marked attenuation and obliteration of the vessels, particularly when they were visible in the posterior segment, would not occur, although the more peripheral complexes would show vasospasm.

On one of the animal slides I have just shown, the posterior segment appeared relatively normal with the abnormal capillary tufts limited to the periphery.

QUESTION: *How do you explain retrolental fibroplasia developing in full-term infants on your scheme of retinal vessel growth?*

DR. PATZ: It seems reasonable, on the basis of our animal studies, that considerable variation in the rate of growth of the retinal vessels could occur, and I can conceive of a full-term infant whose vessels had just reached the ora serrata but in whom vascularization had not been completed.

In animals there is considerable variation in retinal vessel outgrowth for a given age, and we noticed this much more in our kittens than we did in the white rats. In rats we were dealing with a pure strain of animals with a common genetic background, whereas the kittens were offspring of ordinary alley cats, and I would question their genetic background. I think a reasonable degree of variation in human retinal vessel maturation can also be anticipated.

QUESTION: *How do you explain those retrolental fibroplasia cases which get no oxygen?*

DR. PATZ: I would prefer to explain those

on mechanisms other than oxygen, simply adhering to the hypothesis that oxygen is an important, and possibly the principal factor in the development of the disease but that other factors may be basically related. It can be explained within the framework of the oxygen theory, however, on the basis that the fetus in utero has a lowered arterial oxygen content with hemoglobin saturation approximating 50 percent. After birth these premature infants, even in room atmosphere, show a rapid rise in arterial oxygen to approximately 90-percent saturation. It is reasonable to postulate that this increase from the relatively low tensions sustained in utero might account for the very rare case that occurs without supplementary oxygen administration.

DR. FRIEDENWALD: I should like to make some general comments about the questions as a whole, as I have seen them arriving at the desk. Apparently the questioners hold the panel in very high esteem and expect the panel members to answer all the questions that could possibly be formulated about this disease. In fact, I believe we are expected, so to speak, to have a full-dress theory of this disease, complete with white tie and tails, available for you. That is a very nice thing for you to think. However, I believe that there is no disease about which a full and complete theory is at present available, so we need not feel too badly over the fact that there are many of these questions we cannot answer.

Among questions that were directed to me are several about the orbital changes that are alleged to be connected with this disease.

QUESTION: *How does one explain orbital edema in the active stages of the disease?*

DR. FRIEDENWALD: My own feeling is that orbital edema is not a regular or necessary factor in the disease, and I certainly have no explanation for it if it exists.

The second question about the orbit asks whether the apparent enophthalmos that has been demonstrated in several pictures indicates orbital atrophy or not. My own feeling is that it does not indicate orbital change, but merely the fact that these eyes are microphthalmic and that the enophthalmos is apparent rather than real.

QUESTION: *Have these following factors been considered in the evaluation of oxygen therapy? Continuously recorded oxygen analyses of incubators have demonstrated three things:* (1) *marked variation of maximum and average concentration and time at or above the average concentration;* (2) *variation of concentration between types of incubators and settings of the same types of incubators, and* (3) *unexplained variations of oxygen concentration.*

DR. KINSEY: We are certainly cognizant of all these factors, and we tried our best to take these variables into account by taking repeated readings of oxygen concentration and then averaging the values obtained. However, this method only partially resolves some of the problems of interpreting the results and, therefore, too much weight should not be placed on the average concentrations reported. I think one can only generalize with regard to concentration.

QUESTION: *Can ocular damage be produced by placing newborns in oxygen-mixed atmosphere by means of a funnel?*

DR. KINSEY: Presumably yes, if the time of exposure is long enough. Cases of retrolental fibroplasia have been reported from Cincinnati following the administration of oxygen by means of a funnel.

QUESTION: *If rapid transfer to normal air is followed by changes indicating retrolental fibroplasia, what is the rationale of condemning gradual weaning?*

DR. KINSEY: The rationale for condemning gradual weaning is based on the evidence presented, which shows that if you place a baby in oxygen four days instead of two days, the incidence rate doubles. Thus pro-

longing the stay in oxygen increases the risk of contracting retrolental fibroplasia. To balance this risk it would be necessary to have better evidence than I think is now available that rapid withdrawal increases the incidence of retrolental fibroplasia to a greater extent than the extra exposure to oxygen which may be involved in gradual weaning.

DR. BLODI: I have a number of questions regarding oxygen therapy and withdrawal rate. Dr. Reese has answered these questions in a more or less general way in his closing remarks and I have nothing to add.

QUESTION: *Why do these children rub their eyes with their fists?*

DR. BLODI: I think there are two explanations. One is that this gives them a mechanical stimulation of the retina and they enjoy seeing light stars and other visual images. The other explanation is that such behavior is psychologic.

QUESTION: *How does one prevent or manage intraocular hemorrhage in the cicatricial stage?*

DR. BLODI: I don't know of any way of preventing it, and the treatment chosen depends very much upon the intraocular pressure.

QUESTION: *What is the frequency of myopia as a residual?*

DR. BLODI: I think it is quite high, and I believe that Dr. Reese in his forthcoming paper will give the exact figures on that.

QUESTION: *Is there any evidence of an identical pathogenesis and etiology with hemangioblastoma?*

DR. SILVERMAN: We have only clinical observations to report, although the histologic appearance of the cutaneous hemangioma that occurs in premature infants resembles that of retrolental fibroplasia very closely. Experience in our own nursery indicates that there is a relationship between the incidence of postnatally appearing hemangiomas and the degree of prematurity. Among the more immature infants there is a higher incidence of hemangiomas. However, there is no dependent relationship with retrolental fibroplasia.

I should like to mention a recent observation which, I must warn, is at this time merely a tenuous suggestion. We have been plotting the incidence of postnatally appearing hemangiomas for the past five years, and we have observed that the incidence of these skin lesions decreased when the prolonged administration of oxygen in high percentage was discontinued as routine procedure. Whether this decrease was real or merely the result of chance must await a larger experience. I mention our experience to stimulate others to look for a similar association.

QUESTION: *Two variables in the incubator environment of the prematures, moisture and heat, have not been discussed. Do these two factors have any significance in the etiology of retrolental fibroplasia?*

DR. SILVERMAN: I think this question can be answered by saying that there is no published evidence that either of these factors is important in the production of the disease. There is no reason to suspect that moisture would be involved. It is possible that heat is a factor, and perhaps the role of heat will be further elucidated in animal work. There is no clinical evidence or published experimental evidence to bear on this point.

CORNEOCONJUNCTIVAL GRAFTING

In total symblepharon with existing globe

Mario Pagani, M.D.
Vercelli, Italy

The operative treatment of total symblepharon is one of the hardest and most unpleasant tasks for the ocular surgeon. Although it is relatively simple to implant a pedunculated skin flap into a hollow freed from the ocular globe, whenever the globe is still present, cutaneous grafting is impractical because of the eye movements and because the eye does not tolerate dermic or epidermic grafts. More suitable in these cases are mucous membranes, which have the great advantage of greater smoothness and which are easier to fold; on the other hand, they are not aesthetic, are not always available, and may give trouble because of their enormous secretions.

In total symblepharon where a big amount of material is required, other sources have to be sought and exploited: fetal membranes and autopsy material. The last-named substance has been employed and found satisfactory in total symblepharon with an existing globe.

The operative method which I have worked out is based upon the following principles:

1. The intervention should be performed at one time.

2. The implant flap, a unique one, has to be sufficiently large. For this reason the whole cadaver conjunctival socket is used, including the superficial layers of the tarsus and cornea.

3. If adequate measures are not employed, that is, if one doesn't use traction loops in the bottom of the fornices and keep them stretched with a prosthesis for a sufficiently long time, it is quite impossible to prevent the fornices from shrinking together again (in case of an existing globe).

4. It is necessary to cover the whole conjunctival socket with a grafting flap, with no break in continuity, including the cornea, which has previously been freed from the symblepharon attachments. For this purpose it is necessary to prepare the conjunctival flap taken from the cadaver, including in it the limbus contour together with the more superficial layers of the cornea, in just the same way as in the lamellar keratectomy. Thus my technique avoids the possibility that the unprotected raw surface of the cornea might attract to itself the implanted flap, taking it off and away from the fornices during the process of cicatrization.

5. The implant material must be of the same anatomic structure as the host. That is the reason why I have come to prefer homoplastic conjunctival and corneal tissue, even of autopsy origin.

Preparation of donor material

The material must be taken from the cadaver under strictly aseptic conditions—a penicillin collyrium should be dropped into the conjunctival socket as early as possible.

Then, by means of a keratome, the tarsal-conjunctival flap is carefully separated midway from the muscular-cutaneous one, in the upper eyelid as well as in the lower one. The conjunctiva is then freed from the fornices and the globe.

At the limbus, not only the conjunctiva around the cornea is dissected but also the superficial layers of the donor cornea are removed by means of a corneal knife as is commonly done in a lamellar keratectomy. The whole flap, with no break in continuity, is then placed on a paraffin sphere, epithelium face down, in order to remove with the scissors any superfluous material.

The paraffin sphere bearing the flap is put into a sterilized glass jar, on the bottom of which lies a small, round piece of filter paper, soaked with penicillin (200,000 units

in two ml. of physiologic saline solution). The glass jar, hermetically sealed, is then kept at +2°C. until needed. Thanks to the moist chamber prepared in this way, the conjunctiva and cornea keep their transparency for more than 10 days.

Operation

Premedication

If the patient is a child and general anesthesia is required, he is given 0.0003 gm. atropine sulfate per kg. bodyweight an hour before the pentothal anesthesia; however, it is preferable to operate at a more advanced age when the patient can actively co-operate in the postoperative treatment, which is a very delicate phase.

In older patients the premedication is 0.10 gm. sodium pentobarbital at bedtime the evening before the operation, and 0.5 gm. about two hours before the operation in the morning.

Local anesthesia

Akinesia is obtained by a combination of topical van Lint infiltration and deep retrobulbar injection, using a two-percent novocaine solution with adrenalin. Finally, infiltration of the residual symblepharon conjunctiva is performed.

Incision

By means of a triangular knife the conjunctiva is cut in the horizontal meridian

Fig. 1 (Pagani). The traction loops in place.

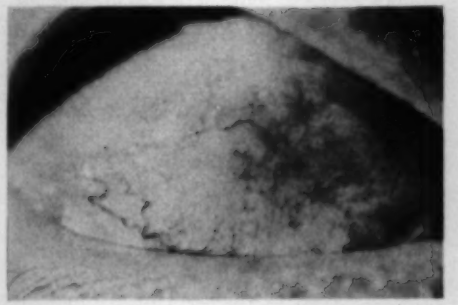

Fig. 2 (Pagani). Showing thick, vascularized tissue at the limbus.

from the internal to the external lid angle; the atrophic stumps of conjunctiva and tarsus are then prepared with great accuracy, by detaching them from the cornea and sclera and then deepening the incision in order to reach the orbital contour. If a larger operative field is needed in the orbit, the incision is widened even beyond the external commissure.

The flap is now taken from the glass container (it is still lying on the paraffin sphere) and is applied gently to the globe, with of course, the epithelium turned upward (the corneal portion is easily recognized); the whole flap is placed in order to cover the contours of the hollow made by dissection of the symblepharon. Once this is done, scissors are used to remove any superfluous implant tissue.

The flap is then sewed in place with a continuous (front to front) 6-0 silk suture. The lamellar layer of the donor cornea must face and cover the host cornea exactly. In order to avoid any possible displacement of the flap, this is anchored on the underlying parts by four stitches (at the 3-, 6-, 9- and 12-o'clock positions) on the limbus, using a woman's hair.

Inserted into the socket is a double glass conformer (type, Record) which, because of its smooth edges, doesn't injure the implant flap in any way (especially on the fornix foldings). This glass conformer is left in place, at least for the first days. It has another important task—that is, to prevent

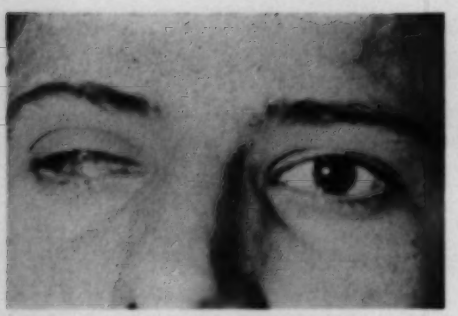

Fig. 3 (Pagani). Appearance of an operated eye.

shrinkage of the fornices; this shrinkage pull is very strong, particularly when the globe is still present. To avoid shrinkage of the fornices, three traction loops are placed in the upper fornix, as well as in the lower one, out from the orbital rim, and their ends are anchored to small gauze rolls.

A useful method for producing uniform fornices, as well as lateral recesses, is to place a rubber tube under the loops (for example, a piece of Nelaton size 8), so as to widen them and push them laterally. After the glass conformer has been placed, a binocular bandage is applied.

At the first dressing after 24 hours, the conformer is removed to clean the conjunctival socket and then replaced. If there is discomfort for the first days, novocaine (two percent) drops are instilled. About the fourth day the dead-looking flap gradually assumes the rose color characteristic of vital conjunctiva.

Ten days later the conformer is used only at night. On the 15th day after the operation it is permanently removed together with the traction loops. Once these have been removed, their action is largely replaced by the fibrous tissue which has grown along the fistulous passage through the lids. Although every means is employed to prevent shrinking (even partial) of the fornices (especially of the upper one) it is almost impossible to avoid it completely. However, the residual space will be quite sufficient to hold a prosthesis, if one is indicated. In any event, the globe and the lids have been freed and their action is again uninhibited.

Within a short time a fibrin veil causes the two raw surfaces to adhere to each other. A thick net of newly formed vessels and capillary infiltration replaces the fibrin veil little by little, giving the donor's conjunctiva and cornea a slightly opaque, gray appearance. Only a thick vascularized tissue is left at the limbus where no longer is there a difference between conjunctiva and cornea.

New vessel formation may be controlled by the application of X rays. This is necessary in those cases in which a functional keratectomy (lamellar or perforating) is to be attempted later.

Viale Garibaldi 30.

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CHANGES IN VOLUME UNDER OCULAR BANDAGES AND THE APPLICATION OF POSITIVE PRESSURE TO THE ORBIT*

CLEMENT MCCULLOCH, M.D., AND R. F. COWAN, M.D.
Toronto, Ontario

Either a Wheeler patch or a bandage around the head is used in clinical practice to apply pressure on the orbit. These are employed following plastic procedures, enucleation, dacryocystectomy, in fact, following any surgical procedure when pressure against the orbit is desired. The surgeon knows little of the pressure which is exerted by such bandages, or of how long it lasts. He has but gross control of the amount and duration of the pressure on the orbit. Quantitative knowledge of what pressures are produced by ophthalmic bandages and some better method of exerting force on the orbit is needed.

The changes in volume which occur under large dressings, as in the treatment of burns, have been investigated.[1] This has been done by using bags placed under the bandages. Such a method is applicable to the orbit. By placing a bag connected to a reservoir under an ocular bandage it is possible to study the changes in volume which occur under the bandage and to gain some idea of the pressure which is exerted on the orbit. In such a system the pressure exerted by the bag itself can be controlled, and indeed, through the bag, the force exerted on the orbit can be set and maintained at any desired level. Clinically, this method of controlling the pressure applied to an orbit is a decided improvement on the application of pressure by a Wheeler patch or by a bandage about the head.

A vinyl plastic bag (fig. 1) for use under an ocular bandage has been developed.† Vinyl plastic has been chosen after trying rubber, polyethylene, and cellophane. Rubber p'aced under a bandage for several days was found to be irritating. Polyethylene was a moderately satisfactory material but was too rigid and did not mould easily to the orbit. A strong joint between the bag and the connecting tube could not be obtained with cellophane. Vinyl plastic produces a strong, soft bag which is not irritating. No case of allergy to this plastic has occurred. The bag is approximately 7.5 cm. by 7.5 cm. and is connected to a rubber tube of 3.0 mm. inside diameter. The joints at the edges of the bag, and between the bag and the tube, are strong and will withstand more than 150 mm. of mercury pressure.

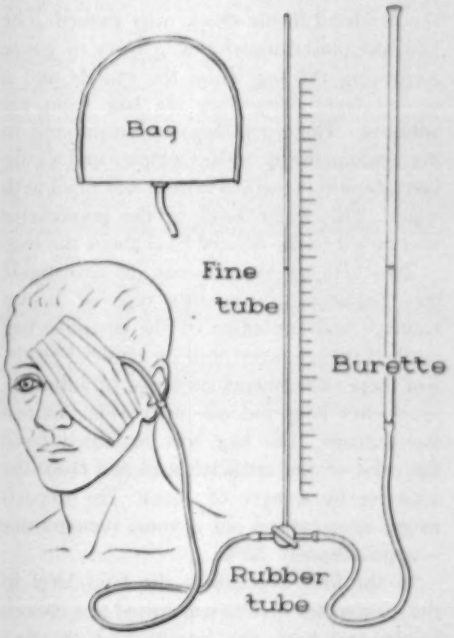

Fig. 1 (McCulloch and Cowan). The plastic bag, its application to the orbit, and its connections to a manometer.

* From the Institute of Aviation Medicine, Royal Canadian Air Force, and the Department of Ophthalmology, Faculty of Medicine, University of Toronto. Given before the Canadian Ophthalmological Society, September 9, 1954.

† Can be purchased from Imperial Optical Company, Dundas Square, Toronto.

A manometer system was constructed to connect with the bag (fig. 1). This system was designed so that the rate of flow into the bag could be recorded. A burette was used to measure large changes in volume, a fine tube being set into the system to measure small changes in volume. A three-way tap allowed a connection between the bag and these two vertical tubes, in any combination which might be desired. The system was filled with water but a scale calibrated in millimeters of mercury was set beside the vertical tubes. For ordinary clinical practice this complicated manometer system is unnecessary; a simple tube connected to a reservoir is adequate.

Only one type of ocular bandage was investigated. Although a bandage about the head reinforcing an adhesive dressing is clinically useful only a Wheeler patch, or bandage consisting of strips of one inch adhesive set obliquely across the orbit from the forehead to the cheek, was studied. The bag was placed under this, a layer of gauze separating the bag from the eyelids and a second layer separating the bag from the adhesive. The vinyl bag was connected to the manometer by a glass adapter and a rubber tube and the whole system was filled with water. The water level in the manometer was raised to the desired level above the bag.

Two sets of experiments, to investigate the characteristics of this type of ocular bandage and the effect of the pressure bag on the bandage, were done on artificial heads. For these experiments six strips of adhesive, six inches long and one inch wide, formed the bandage. The bag was separated from the orbit of the artificial head and from the adhesive by a layer of gauze. The experiments were carried out at room temperature —approximately 22°C.

In the first experiment the fluid level in the manometer system was raised to a chosen height and both the burette and the fine vertical tube were connected to the bag. After a 20-minute period, to allow the bag to fill, the water level in the burette was read. Then the stopcock was turned until only the fine vertical tube was connected to the bag, and the fall in the fluid level during five minutes was recorded. After the five-minute period the tap was turned back so that the burette was again connected to the bag and the apparatus was left in this position until the next reading, 55 minutes later. As the water level fell below the prescribed pressure for the experiment the burette was raised to bring the level to the original height. Readings were repeated each hour during the day; the apparatus was left with burette connected to the bag during the night. Levels of 35, 50, 65, and 80 mm. Hg were used, the experiment being done 15 times at 35 and at 50 mm. Hg, and five times at 65 and at 80 mm. Hg.

Even when applied to artificial heads, where the technique of application and the amount of adhesive could be controlled accurately, the resistance of the bandages varied. A pressure which would quickly loosen one bandage would be easily withstood by another. On hot days and on damp days the bandages came off quickly, but on cool and dry days they tended to stay on the heads. Because of this variation it is not reasonable to average the results from the experiments. Despite the fact that the resistance of the bandages varied widely, a similar type of result was obtained from all.

For the first hour or two the bandage gave way steadily and the bag would fill. Then the bandage tended to reach a degree of resistance when little fluid entered the bag. This state was maintained relatively constantly until the bandage started its final loosening. Gradually but increasingly water ran into the bag until the bandage was torn from the head by the bag.

Figure 2 shows the findings from an experiment in which the pressure was maintained at 35 mm. Hg and is typical of the curves obtained from all the bandages.

During the initial four hours the bag filled rapidly, during the next 14 hours only a small amount of fluid entered the bag,

finally, during the last four hours fluid entered the bag more quickly and the bandage became loose.

Figure 3 shows data relative to the flow of fluid into the bag for five-minute periods during one of the experiments when the chosen level of pressure was 65 mm. Hg.

When the flow into the bag was tested for this shorter time, a similar result was obtained. During the first three hours the fluid entered rapidly. Then, for most of the life of the bandage, the fluid entered only slowly. Finally, the rate of entry increased and the bandage loosened.

In the second experiment the flow of fluid into the bag under various heads of pressure was tested. After the bag had been placed under the bandage on the artificial head and the tubing connected, the pressure was set at 35 mm. Hg and the bag was allowed to fill for an hour. Flow into the bag during five minutes was recorded. Then the pressure was raised to 50 mm. Hg, and the bag was allowed to fill for half an hour. The flow over a five-minute period was again recorded. Measurement of flow was repeated at 65, 80, 65, 50, and 35 mm. Hg. The experiment was done 15 times.

Again the results varied sufficiently so that figures obtained by averaging would have little significance. However, all the bandages

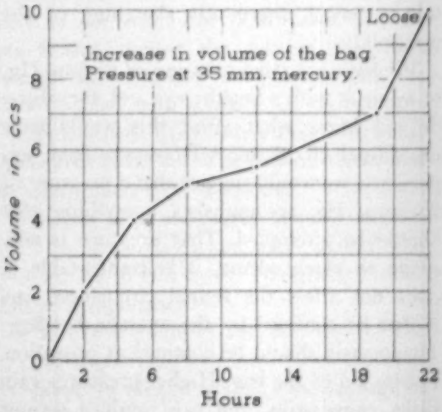

Fig. 2 (McCulloch and Cowan).

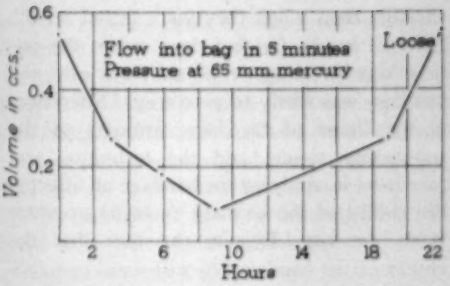

Fig. 3 (McCulloch and Cowan).

filled much quicker when under high than when under low pressure. Data from one experiment, which was typical of the group, are presented in Figure 4. In this experiment the flow at 20 mm. Hg pressure was zero. As the pressure increased the flow increased; for the higher pressures the bag filled rapidly.

The bag has been used on patients who had various ocular pathologic conditions, and on a few patients who had no ocular disease. In each case the bag was applied and the volumes were recorded, just as had been done when using the artificial heads. This experience has tended to confirm the findings from the experiments with the artificial heads. It also suggested the clinical value and the complications arising from the use of controlled positive pressure.

The strength, or the resistance, of the bandages on human heads was even more

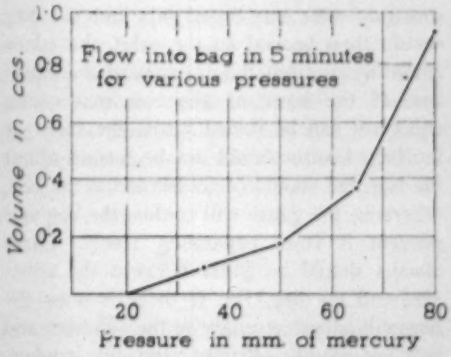

Fig. 4 (McCulloch and Cowan).

variable than when they were tested on the artificial heads. On hot days, when the patient was sweating or his skin was oily, the bandage was likely to give way. Differences in the shape of the face, firmness of the supporting tissue, and the technique and care used in applying the bandage all affected the ability of the bandage to resist pressure from the bag. Despite the fact that the ability of the bandages to withstand pressure varied greatly the type of response from all the bandages was similar.

After an initial filling period of one to three hours a steady state was reached, when the bag filled slowly but constantly. This continued for a number of hours, the exact time depending on the firmness of the bandage. Finally, the bag began to fill more rapidly and the bandage became loose. A well-placed bandage can resist a pressure up to 35 mm. Hg for two days. If pressures above that are used the bandage probably will loosen rapidly, although an occasional bandage will adequately confine 65 mm. Hg. Flannel or gauze reinforcing about the head will allow the bandage to resist 80 mm. Hg.

Care must be taken when putting on the bandage. It is wise to insert the glass adaptor firmly in the tube from the bag and to reinforce the joint with adhesive. If this joint works loose during the night, the patient gains a wet bed and will roundly curse the apparatus and the physician.

A double layer of gauze should be placed smoothly over the closed lids and the bag should then be laid on the orbit, the edges curled away from the eye toward the bandage. If the layer of gauze is made long enough it can be folded across the front of the bag. Gauze should not be wound about the bag, but should be folded across the bag, otherwise the gauze will confine the bag and prevent it from expanding freely. There always should be gauze between the adhesive and the bag, for, if there is none the bag will adhere strongly to the adhesive and will not readily separate after the bandage has been used.

The adhesive should be applied firmly and smoothly. An extra piece of adhesive should be brought along both sides of the bandage, so that the bag may not creep out onto the cheek or onto the side of the nose. While the pressure is maintained the patient must stay in bed, although his head may be raised. The fluid level in the manometer must then be raised to keep the level at the prescribed height above the bag.

Experience has shown the pressure levels which may be used. Postoperative edema is not prevented by 10 mm. Hg pressure. A pressure of 25 mm. Hg will prevent edema and is comfortable. A pressure of 35 mm. Hg will also prevent edema, but will not prevent secondary hemorrhage. This pressure is noticeable to the patient, who may complain. A pressure of 65 mm. Hg will usually become painful. It will tend to force open the lids, by compressing them under the orbital margin, and could lead to dangerous exposure of the cornea. It probably stops postoperative hemorrhage from small vessels. In one case it caused a slough of the upper lid.

The patient was a 75-year-old man with a melanoma which had filled the eyeball, and which protruded anteriorly as a large, dark mass, the size of a golf ball. At enucleation there was considerable bleeding. The bag was applied and the pressure was set at 65 mm. Hg. On the second day, when the bag was removed, there was sloughing of the upper lid.

We have not put a pressure of 65 mm. Hg. to an orbit with a healthy eye and, therefore, do not know what affect this would have on retinal circulation.[2] However, from experience, we would suggest that a pressure of 25 mm. Hg accomplishes everything that should be attempted. That pressure is adequate to block edema, it is comfortable, it does not affect the retinal circulation, and it can be confined by the average bandage. Hemostasis should be obtained at operation, not by aid of the bag. Higher pressures gain little, cause pain, and can produce serious complications.

The bag has a quieting effect. When it

is on the patient will tend not to move his eye. Also he will be disposed not to squeeze or blink. The orbicularis is a fast-acting muscle, but it is not capable of resisting a low but steady pressure. After the bag has been on a short while the patient will stop squeezing and will hold his eye still.

The patient, a 28-year-old man, was burned across both corneas by gas from a refrigerator in 1947. Eventually both corneas were extensively scarred and vision was reduced to count fingers at two feet. In February, 1954, a lamellar keratoplasty was done on the left eye. Following this the visual acuity was 20/200 and some scar and deep vessels remained under the graft. In August, 1954, a penetrating keratoplasty was done on the left eye, the bag was placed over the eye at the end of the operation and the pressure was set at 20 mm. Hg. During the period of recovery, comparing the two operations, the patient commented that the bag was very comfortable, that he had not the strength to squeeze his lids, and he had no tendency to move his eye.

The bag has been valuable in certain clinical conditions.

1. It has been used after enucleation in 13 cases; it controls edema and maintains a healthy orbit.

2. It has been used after dacryocystectomy in three cases and after dacryocystorhinostomy in one case. For these cases the bag was folded against the side of the nose. Edema was blocked completely and the tissues healed with a minimum of reaction.

3. It has been used in five cases of plastic procedures to the lid. The lack of edema and the clean union were dramatic.

4. It has been used after lamellar keratoplasty in three cases and after penetrating keratoplasty in two cases. The grafts "took" without complication.

5. It has been used for late loss of the anterior chamber after cataract extraction in five cases. In all the wound was leaking. In four cases when the eye was viewed after two days the anterior chamber had reformed. In one case the wound gaped further and finally healed with a large incarceration of the iris.

6. It has been used for lack of formation of anterior chamber after filtering operations for glaucoma in three cases. In all three instances the anterior chamber was reformed when the eye was viewed on the second day.

7. In one patient the bag was used after repair of a perforated corneal ulcer.

The patient was a 27-year-old housewife. She had had a dendritic corneal ulcer which had been treated for four months with cortisone and which finally perforated. Four days after the perforation two large tongues of conjunctiva were brought across the cornea from the limbus at the 5 o'clock and the 11 o'clock positions and were sutured over the ulcer. The bag was applied and the pressure set at 35 mm. Hg. When the eye was first viewed, two days later, the conjunctiva was sealed into the wound and the anterior chamber was partly reformed. The eye has continued with a normal tension and with a large band of conjuctiva covering the site of the ulcer and forming a firm scar.

The bag has been used after uncomplicated cataract extraction and after surgery for retinal detachment. There has been no complication from the use of the bag in these conditions. The bag may be valuable in the treatment of a corneal graft protruding forward after keratoplasty; however, we have not had such a case on which to try it.

The bag does prevent edema after surgery for squint. It was used in two cases. The pressure seemed to immobilize the eye and to slow recovery of normal motility. Therefore, since then we have not used the bag after operations for squint, but have left the operated eye uncovered, or have uncovered it the next day.

Discussion

Even on the artificial heads such wide variations in the resistance of the bandages to pressure were present that averaging the data from the trials is not valid. Variation using the human heads was even greater.

However, for all the bandages, the inflow increased markedly for the higher pressures.

A general mathematic expression for the resistance of ocular bandages should not be deduced from the data which have been obtained. The data portrayed in Figure 4 appear to lie on a smooth curve having approximately the shape of an exponential function ($V = .015e^{.05P}$). However, this shape may be due to a combination of two or more functions which are approximately linear and which are related to the elastic and viscous properties of adhesive tape.

The conclusions from the experiments on the artificial heads and from the data collected during clinical use of the bag are not surprising. It is general clinical experience that as soon as a bandage is applied it starts to loosen, and that after a few hours it probably reaches a more constant state which lasts until the final loosening of the bandage, when it is about to come off. While these conclusions are not surprising they do highlight the fact that the clinician has inadequate control of the pressure he applies to an orbit by the use of the standard ocular bandage.

A pressure dressing exerts more pressure than does a Wheeler patch, but only the grossest control can be possible. For either type of dressing the force applied to the adhesive during the application of the bandage does not represent the force exerted on the orbit. Actually, this latter force is unknown.

Too much pressure may be produced, causing necrosis of tissue. More often too little pressure is obtained, and the bandage does not perform the function which is expected of it. From the moment the bandage is applied it starts to slacken so that shortly the pressure may be inadequate. Only qualitative control of pressure, both as regard degree and duration, can be achieved by the standard bandages.

In comparison to this the control which is possible when a bag is used is exact. The amount of pressure can be regulated, it is evenly distributed across the orbit, it is continuous, not varying with time. It can be started immediately, maintained accurately, and kept at the desired level until the moment when it is to be stopped.

The clinical value of the apparatus is limited but on a few occasions it can be of great help. If the bag and bandages are put on neatly, if high pressures are not used, and if the cases for which it is to be used are chosen conservatively, complications will not occur and the results can be happy.

Summary and Conclusions

A vinyl plastic bag designed to be placed under a Wheeler patch and connected to a manometer has been developed. With this apparatus the loosening which occurs during the life of an ocular bandage has been investigated. The bag has been used clinically to apply constant pressure to the orbit.

A Wheeler patch has certain characteristics. It relaxes for one to three hours after it is applied, it then remains at a more steady state until close to the end of its life, when it again loosens.

Constant pressure on the orbit from the bag was found valuable after enucleation, operations on the tear sacs, plastic operations on the orbit, keratoplasty, and after loss of the anterior chamber following cataract extraction and following filtering operations.

Medical Arts Building (5).

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MOLLUSCUM SEBACEUM (KERATO-ACANTHOMA)*

Or squamous-cell carcinoma of the lid?

Albert D. Ruedemann, Jr., M.D., and Carl G. Hoak, M.D.
Randolph Field, Texas

The differential diagnosis of molluscum sebaceum and squamous-cell carcinoma is a difficult one, both clinically and pathologically. The following case was treated as a squamous-cell carcinoma but may well have been molluscum sebaceum.

Review of the literature

American textbooks of dermatology use the term "molluscum sebaceum" as a synonym for "molluscum contagiosum," making no suggestion that the two may be separate entities. A recent Dutch text of dermatology considered the lesions separately, discussing molluscum sebaceum along with squamous-cell carcinoma.[1]

MacCormac and Scarff[2] suggested this term for a lesion of the face characterized by gross and microscopic superficial resemblance to molluscum contagiosum and by rapidity of development. They described it histologically as a raised cyst lined by hypertrophic epithelium without inclusion bodies and suggested as its histogenesis hypertrophic inflammatory changes in a sebaceous cyst.

Musso, for Gordon,[3] reported spontaneous resolution of a similar tumor described as umbilicated with a keratotic center. This lesion was biopsied and found benign. In the discussion of this paper, the confusion between this lesion and squamous-cell carcinoma was emphasized. Rook and Whimster[4] presented an excellent histologic description of the tumor which they preferred to call "kerato-acanthoma."

Beare[5] emphasized the frequency of the tumor in a paper presenting 76 cases, of which seven occurred on the eyelids. He advised incising the tumor flush with the skin and effecting hemostasis by light cautery as satisfactory treatment with optimum cosmetic results.

Halnan,[6] referring to the tumor as "molluscum pseudocarcinomatosum," took exception to less than radical treatment and raised the question whether it would not be prudent to treat all such lesions as squamous-cell carcinoma.

Zoon, Hansen, and van Baak[7] agreed with Beare that a biopsy is essential to diagnosis and preferred the term "kerato-acanthoma." Finney[8] reported successful treatment of 25 cases of molluscum sebaceum by radiotherapy alone.

Levy, Cahn, Shaffer, and Beerman[9] observed six cases believed to be kerato-acanthoma. They treated four with roentgen-ray therapy or electrosurgery and allowed two patients to go untreated. Spontaneous resolution of these two lesions occurred in spite of the fact the original biopsy diagnosis in each case was early prickle-cell carcinoma.

Lesions related to molluscum sebaceum were first reported by Smith[10] and called by him "self-healing epithelioma of the skin." These lesions were described as histologically identical with low-grade squamous-cell carcinoma but had a marked tendency to spontaneous healing. Charteris[11] reported several similar cases. Wittin and Zak[12] reported in detail a case of primary, self-healing epithelioma in which the multiplicity of lesions is striking. The relationship of molluscum sebaceum to spontaneously healing epithelioma is somewhat confused, but Fouracres and Whittick[13] called attention to their close similarity and stressed the lack of any single differentiating feature from true squamous-cell cancer.

Case report

A. W., a 22-year-old white man, was first seen in the eye clinic, Randolph Air Force

* From the Departments of Ophthalmology and Pathology, USAF School of Aviation Medicine, Randolph Air Force Base.

Fig. 1 (Ruedemann and Hoak). Preoperative lesion. Note the clean area of healing inferior-temporal where the biopsy was taken.

Base Hospital, on April 7, 1954. He stated that approximately two months prior to this date a small "bruise" appeared on his right lower lid. This gradually enlarged to a cyst-like mass and continued to grow until the patient sought clinical aid. He stated that there were no symptoms except a slight itching. He had no other similar lesions on his body. Since he had recently returned from Okinawa, he was questioned regarding fungus lesions but gave a history of nothing more severe than rash at the beltline easily controlled by medication.

Eye examination was entirely negative except for a raised, indurated, umbilicated mass with a necrotic center and increased vascularization at its margins, measuring approximately one cm. by one cm. in diameter. There were several pearly white nodules within its body. There was no regional lymphadenopathy. A scraping of the necrotic central mass revealed no molluscum contagiosum bodies and only a few large cocci and epithelial cells.

Fig. 2 (Ruedemann and Hoak). View of operative site.

Fig. 3 (Ruedemann and Hoak). Postoperative eight weeks.

An inferior lateral portion of the tumor was removed for biopsy. The lesion healed completely and uneventfully, although the mass increased in size quite noticeably (fig. 1). Pathologic diagnosis of the biopsy was squamous-cell carcinoma, grade I. In view of the patient's age and the rapid growth of the lesion, a complete excision of the mass down to the tarsus with blepharoplasty was performed on April 27, 1954 (fig. 2). By this time the biopsy specimen had been reviewed by several pathologists, all of whom agreed upon the diagnosis of squamous-cell carcinoma. Postoperative course was uneventful, and the patient showed complete healing without recurrence to date (fig. 3).

Histopathologic description

The microscopic picture of the biopsy specimen was dominated by the marked epithelial hyperplasia and apparent invasion of the corium. There was some keratinization of individual cells, and epithelial pearls were numerous and large. Mitotic figures were fairly numerous, and cellular atypicality was seen frequently. This lesion, as it

appears in the biopsy, suggested very strongly a low-grade squamous-cell carcinoma (fig. 4).

The total lesion grossly measured about 10 mm. in diameter, had a firm, white, rolled edge, and an umbilicated center composed of friable, keratotic material. Examination at a very low magnification revealed a remarkable resemblance to the lesion of molluscum contagiosum.

Microscopic examination revealed a tumor partially enclosed in a craterlike structure composed of a reduplication of adjacent epidermis. The tumor consisted of an acanthotic and hyperkeratotic stratum malpighii with great masses of friable keratin at one pole (fig. 5). The central portion was composed of strands of large pale-staining cells which appeared to invade the corium (fig. 6).

Fig. 4 (Ruedemann and Hoak). Section of biopsy showing resemblance to squamous-cell carcinoma. (×75.)

Fig. 5 (Ruedemann and Hoak). Section of whole tumor. Note superficial position. (×15.)

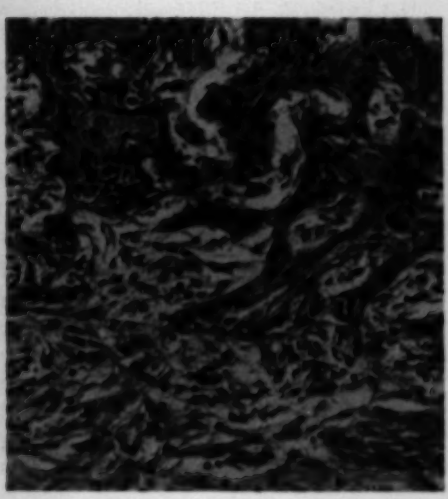

Fig. 6 (Ruedemann and Hoak). Base of lesion showing apparent invasion of the corium. (×240.)

Whether this represented a malignant change or pseudoepitheliomatous hyperplasia remains a question. The lesion rested on a base of granulation tissue infiltrated with inflammatory cells and a few giant cells.

Summary and Conclusions

1. The clinical entity of molluscum sebaceum has been rarely described in American literature. This probably represents failure of recognition, but certainly this lesion is infrequently found involving the lids.

2. The clinical differential diagnosis between molluscum sebaceum and well-differentiated squamous-cell carcinoma is extremely difficult. The former is characterized by rapid growth, reaching maximum size in seven to 11 weeks without regional lymphadenopathy. It appears as a well-circumscribed, raised lesion with umbilicated, highly keratinized center.

3. Histopathologic differentiation between molluscum sebaceum and grade I squamous-cell carcinoma is not only difficult but may be impossible without clinical correlation.

4. From a prognostic standpoint, exact diagnosis may be of importance, but the best treatment is probably excision of the entire mass at the base with cautery for hemostasis.

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PHARMACODYNAMICS OF THE CILIARY GANGLION*

Paul Weinstein, M.D.
Budapest, Hungary

According to the modern teaching of anatomy, synapses in the ciliary ganglion could only occur if the parasympathetic oculomotor fibers innervated the ciliary muscle (miosis, accommodation), while the sensory fibers coming from the trigeminal nerve and the sympathetic fibers coming from the superior cervical ganglion pass through without any synapse in the ciliary ganglion. This anatomic fact can be proved pharmacologically:

Tetraethylammonium bromide (TEAB)† or Pendiomid injected retrobulbarly para-

* From the Department of Ophthalmology, State Hospital of Szabolcs Utca.

† TEAB and Redergam are Hungarian drugs. Pendiomid is made by the Ciba Pharmaceutical Company. Hydergin is a product of Sandoz. I wish to express my thanks to these pharmaceutical houses for so kindly supplying experimental supplies of these drugs.

lyzes the synapses of the ciliary ganglion with the result that the pupil becomes dilated and accommodation paralyzed. No corneal reaction or sympathetic inhibition (ptosis, enophthalmos) was noted. This implies that synapses in the ciliary ganglion could only be with the parasympathetic system. The sensory and sympathetic fibers pass without relay as demonstrated by retrobulbar TEAB paralyzing only those functions which are bound to a synapse in the ciliary ganglion.

With these anatomic relationships in mind, a study was initiated of the intraocular pressure after retrobulbar injections of TEAB (Thiel, Rapisarda). Ocular tension was studied in 20 patients (fig. 1) and a significant decrease in pressure was noted in more than three fourths of the cases. In some glaucomatous cases, the decrease was as much as 30 to 40 mm. Hg; the average decrease was 15 mm. Hg.

These findings would seem to prove that a synapse of the vasomotor fibers also takes place in the ciliary ganglion whose paralysis causes uveal vasoconstriction, which is the main factor producing the decrease in ocular tension. Concomitant with lowered intraocular pressure are a decrease in blood pressure,* an increased venous outflow, and lowered aqueous humor secretion. That these latter effects can, however, only be secondary is shown by the fact that ganglioplegic drugs (retrobulbar novocaine injections, for example), which do not result in a general fall in blood pressure, decrease ocular tension; this would indicate that a synapse of the pupillomotor and vasomotor fibers takes place in the ciliary ganglion.

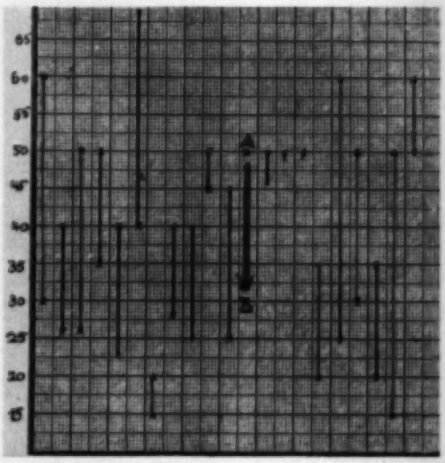

Fig. 1 (Weinstein). Demonstrating a decrease in intraocular pressure after retrobulbar injections of the ganglioplegics, TEAB and Pendiomid. (A-B) Average decrease 15 mm. Hg.

There is also a histomorphologic basis for this statement. Kiss reported, in the 1930s, that there are two types of cells in the ciliary ganglion—chromophil and chromophobe. Savay and Csillik confirmed this finding and reported that Kiss' chromophil cells contain nonspecific esterase, while the chromophobe cells are negative for esterase. These findings seem to indicate that different functions may be assigned to the different ganglion cells.

It is well known that pilocarpine constricts the pupil which has been dilated because of ciliary-ganglion paralysis (a myoneural effect) and that eserine has no effect (cholinesterase effect). In animal experiments, Hoorens demonstrated that, if the sympathetic has been severed, eserine becomes effective. I made the following observations on nine patients who had had novocaine blocking of the stellate ganglion because of eyeground changes (fig. 2):

The pupil dilated by retrobulbar TEAB or Pendiomid injections will remain dilated for over six hours. The pupil remains dilated if a novocaine stellate ganglion block is done simultaneously with the retrobulbar TEAB. If eserine is dropped into the conjunctival sac after retrobulbar TEAB, without a stellate ganglion block, the pupil remains dilated for hours.

After retrobulbar TEAB and simultaneous intravenous Hydergin, the pupil constricts from six to four mm. in an hour. After retrobulbar TEAB and simultaneous novocaine block of the stellate ganglion, the pupil constricts from six to three mm. upon

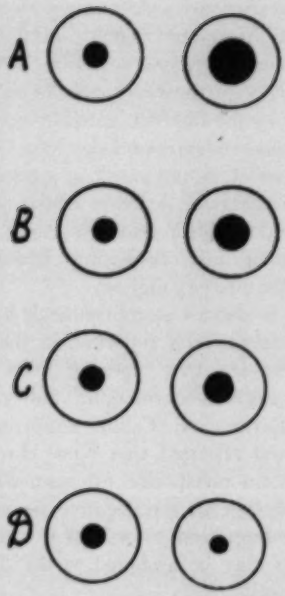

Fig. 2 (Weinstein). Retrobulbar TEAB or Pendiomid into the left eye. Eserine instilled into the left conjunctival sac. Pupil measurements after one hour: (A) six mm. (B) Constricted to four mm. after intravenous Hydergin. (C) Constricted to three mm. after novocaine block of stellate ganglion. (D) Constricted to 1.5 mm. after intravenous Redergam.

instillation of eserine. After retrobulbar TEAB and simultaneous intravenous Redergam, the pupil constricts from six to 1.5 mm. upon instillation of eserine drops.

These experiments confirm those of Burn and Philpot who demonstrated in animals that the cholinesterase contents of the iris decreases significantly after sympathetic blocking. This explains the efficacy of eserine; it is able to activate the acetylcholine which is not yet decomposed and the acetylcholine which the blood brings to the iris, for the cholinesterase contents of the iris are decreased about 40 percent by blocking of the sympathetic.

Summary

After a retrobulbar injection of TEAB or Pendiomid, the pupil becomes dilated, the accommodation paralyzed, and the intraocular pressure decreased. This seems to be proof that the pupillomotor and vasomotor fibers have a synapse in the ciliary ganglion. Eserine does not constrict the pupil dilated by retrobulbar TEAB or Pendiomid. However, eserine will constrict the pupil after retrobulbar TEAB or Pendiomid if the sympathetic is blocked simultaneously with injection of these drugs. This would indicate that the cholinesterase contents of the iris decrease after sympathetic denervation.

V. Szemelynok U. 9/11.

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UVEITIS IN THE CONTRALATERAL EYE FOLLOWING CATARACT EXTRACTION*

BERNARD KRONENBERG, M.D.
New York

The form of uveitis to be discussed is not widely recognized. It is a form of uveitis which develops in the unoperated eye following cataract extraction in the fellow eye. As a clinical entity it presents a difficult diagnostic and therapeutic problem. It must be differentiated from such other similar conditions as (1) sympathetic ophthalmia and (2) a coincidental uveitis. It is of utmost importance to make the correct diagnosis because the therapeutic approach is different for each of these conditions.

Since my original intention to report these clinical observations, a number of other independent observers have reported similar conclusions. I find also that, in 1942, Courtney[1] discussed this problem.

The fact that lens tissue in the eye may cause a varying degree of ocular reaction has been known for a long time. After a traumatic or operative injury to the lens, an inflammatory reaction occurs in some cases, whereas no reaction occurs in others. Some observers have maintained that such reaction is due to an infection, while others believe that it is an irritation caused by lens matter.

Lagrange and Lacoste,[2] in 1911, were the first to present the latter concept. Straub in 1919 coined the term "endophthalmia phacogenetica." He did not consider the fact that some persons were more sensitive to lens protein than others. He maintained that the inflammation was due to a specific toxicity of the lens substance.

Verhoeff and Lemoine,[3] in 1922, described in a series of cases a condition which they termed "endophthalmitis ana-phylactica." These cases were mostly inflammatory reactions to lens substance following either trauma to the eye or an extracapsular cataract operation on the eye. But the reaction was always in the injured or the operated eye itself.

Courtney, in 1942, reported a series of cases in which the reaction occurred in the unoperated eye. His series of cases are very similar to the ones presented here.

Irvine and Irvine, in 1952,[4] differentiated the following three types of ocular responses to lens substance:

1. Endophthalmitis phacoanaphylactica. In this the pathology is predominantly a polymorphonuclear and giant-cell reaction.

2. A phacotoxic response due to the toxicity of the lens fluid analogous to the reaction produced by any necrotic tissue. Pathologically this group presents a predominant mononuclear cell infiltration.

3. Phacogenetic glaucoma. This is found in a patient with hypermature lens and leakage of lens substance into the eye cavities. Pathologically they describe little inflammatory response except for the presence of large monocytic macrophages which obstruct the drainage channels of the eye.

In all of these groups, the pathologic process was found to be in the anterior segment.

The syndrome being reported here appears in the unoperated eye in the form of a severe uveitis, either with or without glaucoma. The condition in these cases always follows an extracapsular extraction in the original eye. It consists of the following findings:

1. The operated eye did not show any inflammatory reaction whatsoever.

2. There was no reduction of vision or change in function in the operated eye.

3. The unoperated eye showed a marked ciliary congestion.

4. The keratic precipitates in the unoperated eye were heavy and numerous. They

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* Presented before the New York Society for Clinical Ophthalmology, March 2, 1953.

were of the granulomatous type. They frequently coalesced to form a membrane.

5. The onset of the inflammation in the unoperated eye occurred after a few months or after many years.

6. The early removal of the lens of the unoperated eye led to a rapid quiescence of the condition, and the obtaining of useful vision.

7. Nonintervention or late intervention led to complete destruction of intraocular tissues and total loss of vision including light perception.

The pathogenesis of this condition can be explained by the fact that, following an extracapsular extraction, the individual must absorb whatever lens matter is left in the eye. This absorption process sensitizes some individuals to their own lens protein. Should the lens of the unoperated eye in such sensitized individuals become hypermature and the capsule rupture—or should the capsule rupture for any other reason—then a small amount of lens matter extruded would cause a violent reaction. For this reaction I should like to propose the name "sympathetic lens-induced uveitis." Such a uveitis would be on an allergic basis.

It is interesting to speculate at this point as to why some individuals become sensitized and others not. We know that gradually increasing doses of an antigen can desensitize an individual. Is it possible therefore that some individuals absorb the lens substance gradually and thus desensitize themselves and others absorb it rapidly and through this rapid absorption become sensitized? Skin testing with lens protein has demonstrated the existence of such sensitivity in some individuals.

The question of bilaterality should also be explored. It is true that the cases reported appear to be unilateral. However, I would postulate the possibility that all such cases are bilateral in spite of the quiescent state of the operated eye. It is possible that these patients have a fleeting attack of mild uveitis in the operated eye which is not observed. This reaction occurs in the early postoperative period when a patient is not studied carefully through a slitlamp. The possibility exists, therefore, that all cases are bilateral. In point of fact, Case 2 demonstrates this possibility for the first operated eye did have a fleeting attack of iritis.

In considering the differential diagnosis, sympathetic ophthalmia looms as the most important and the most dreadful. The most pertinent fact to be considered is that in sympathetic ophthalmia the inflammation is always bilateral. The type of inflammatory reaction is also somewhat different. In this condition, however, the operated eye remains quiescent. The keratic precipitates are large and coalesce, whereas in sympathetic ophthalmia they are smaller and do not coalesce. Of course, the final proof is the fact that when the lens is removed in the unoperated eye, the condition subsides.

A coincidental uveitis also has to be excluded. This is not always very easy. However, because of the difference in the therapeutic approach, the differentiation must be made early. The lack of response to any of the usual therapeutic measures such as mydriatics, foreign protein, and cortisone, must lead to the conclusion that this is not a coincidental uveitis. It must, therefore, be a sympathetic lens-induced uveitis. Here again, the final proof is the fact that the eye recovers when the lens is removed.

The therapeutic approach in sympathetic lens-induced uveitis is the prompt removal of the lens of the unoperated eye. Sometimes because of technical reasons it is difficult to remove this lens in its capsule. Even an extracapsular extraction with the removal of as much lens substance as possible can lead to a satisfactory result. The recovery period in such an event may be prolonged.

It might be advisable that all patients who have an extracapsular cataract extraction in one eye be tested for lens protein sensitivity. The sensitive patients could then be carefully watched and prompt action taken at the first sign of sympathetic lens-induced uveitis in the unoperated eye.

de Veer[8] in a paper published (June,

1953) after the presentation of this report before the New York Society for Clinical Ophthalmology (March, 1953) also calls attention to this entity. He was able to examine pathologically three cases. Two eyes were the first or "exciting" type, and one of the "second" type. He gives a detailed description of the microscopic changes. He too feels that it is a bilateral condition. He, furthermore, suggests the early removal of the lens of the "second" eye.

Case reports

Case 1

S. C., a man aged 50 years, consulted me on September 26, 1947. Vision with correction was: R.E., 20/200; L.E., 20/40. Tension was O.U., 18 mm. Hg.

On October 28, 1947, an extracapsular cataract extraction was done on the right eye. Recovery was uneventful. On December 15, 1947, vision was: R.E., +10.0D. sph. ⌒ +2.0D. cyl. ax. 180° = 20/15.

The left eye at this time showed some cells in anterior chamber and keratic precipitates. The lens appeared to have matured rapidly. Vision was reduced to 20/200. The eye was not too congested and a diagnosis of mild iridocyclitis was made.

On January 6, 1948, an attempt was made to remove the lens of the left eye intracapsularly but the capsule ruptured and extraction was finished extracapsularly. This eye developed an iridocyclitis, had a very stormy course, and finally became quiescent.

On March 1, 1948, vision was: L.E., +10.5D. sph. ⌒ +1.0D. cyl. ax. 165° = 20/25. During the course of treatment for the uveitis following the cataract extraction, the patient became sensitive both to atropine and scopolamine. On September 15, 1948, vision was: R.E., +11.0D. sph. ⌒ +3.0D. cyl. ax. 15° = 20/20; L.E., +10.5D. sph. +1.0D. cyl. ax. 165° = 20/20. During the entire period the first operated eye remained quiet.

Case 2

E. F., a woman, aged 89 years, consulted me on April 16, 1951. Vision was: R.E., 2/400; L.E., light perception and projection. The diagnosis was mature cataracts, both eyes, more advanced in the left eye. On April 19, 1951, the cataract of the left eye was extracted extracapsularly. During convalescence, the patient developed a fleeting iritis which was quickly controlled by the local use of cortisone.

On June 19, 1951, vision was: L.E., +12.5D. sph. ⌒ +2.0D. cyl. ax. 165° = 20/25.

On June 24, 1951, the patient complained of redness and pain in the right eye. Vision at this point was light perception and projection in right eye. There was evidence of early iridocyclitis with numerous heavy keratic precipitates and flare. This uveitis despite all measures became more severe so that the exudates coalesced forming a membrane. Light perception was lost.

The intraocular pressure, which at first was 17 mm. Hg (Schiøtz), rose to 40 mm. Hg and then dropped again so that the eye is now soft. This patient also became sensitive to atropine and scopolamine during the course of treatment. Early the patient was advised to have the lens of the right eye removed but refused because of her advanced age.

During this entire period and, when last seen on September 1, 1952, the originally operated eye was white, quiescent and the vision remained the same.

Case 3

L. C., a woman, aged 68 years, consulted me on December 18, 1950. Vision was R.E., light perception and projection. L.E., 20/100. The diagnosis was R.E., mature cataract., L.E., immature cataract.

On December 28, 1950, an extracapsular extraction was performed on the right eye. The recovery was uneventful.

On February 19, 1951, vision was: R.E., +7.5D. sph. ⌒ +1.0D. cyl. ax. 165° = 20/25. The patient was seen again on May 21, 1951. at which time vision was: R.E., +8.5D. sph. ⌒ +1.0 D. cyl. ax. 180° = 20/20−.

On December 3, 1951, she complained of

an inflammation of the left eye of one month's duration. At this time vision with correction was: R.E., 20/25; L.E., good light perception and projection. The tension now was: R.E., 25 mm. Hg; L.E. 60 mm. Hg. There were many cells and large keratic precipitates on Descemet's membrane.

The patient was treated with the usual methods for a secondary glaucoma including a paracentesis. Despite all measures the cells and keratic precipitates increased and the tension remained high.

Believing this to be a sympathetic, lens-induced uveitis, an intracapsular extraction was performed on January 10, 1952. The postoperative course was uneventful and, at the last examination on December 30, 1952, the vision in the second eye was 20/40. The tension was 26 mm. Hg, O.U. During the entire period the first operated eye remained completely quiet.

Case 4

C. M., a woman, aged 52 years, had an extracapsular cataract extraction on the right eye on October 25, 1942. After an uneventful recovery, vision was: R.E., 20/30, with a +11.0D. sph. ⊃ +1.0D. cyl. ax. 180°. The left eye remained quiet for 10 years until early 1952.

On June 2, 1952, the patient gave a history of poor vision and inflammation of the left eye of three months' duration. At this time the left eye showed a great many large keratic precipitates which had coalesced to form a membrane. There was also a hyphema present. The left eye had good light perception and projection. The tension in the left eye was 60 mm. Hg.

Because of the hyphema the extraction of the left lens was delayed. During this period the patient was treated with cortisone and foreign protein. There was no response to the therapy.

Believing this to be a sympathetic lens-induced uveitis, an intracapsular extraction was performed on the left eye on August 27, 1952. At the present time, the vision is L.E., 20/100, with a +11.0D. sph. ⊃ +1.0D. cyl. ax. 15°. During the entire period the first operated right eye remained quiet.

Discussion

In reviewing these cases, the following conclusions are reached:

In Case 1, the lens was removed when the patient had a minimal uveal inflammation. As stated, the lens of the second eye was removed extracapsularly. Because of this, the recovery was stormy. Case 2 points up the fact that nonintervention may lead to total loss of vision. Here the lens was not removed from the unoperated eye because of circumstances beyond my control. In Case 3, the lens was removed after the patient developed uveitis and glaucoma and when none of the usual therapeutic measures for uveitis were successful. This patient, because of the early removal of the lens, now has a vision of 20/40 in the second eye. Again, in Case 4, there was a period of delay but, despite the late intervention and the complicated appearance of the eye when first seen by me, this patient has 20/100 vision in the second eye. It is interesting to note in this case that 10 years elapsed between the first operation and the onset of the uveitis in the unoperated eye.

In none of these cases can the presence of a ruptured lens capsule be proved pathologically. None of the eyes were removed for pathologic study. In the second case it was my clinical impression on observing the patient that there was a small break in the lens capsule. In the fourth case, one must assume that such a break occurred when the lens in the unoperated eye became hypermature. This patient was probably sensitized to lens protein by the extracapsular cataract operation performed 10 years prior, and then developed a sympathetic lens-induced uveitis.

The patients presented appear to show a definite clinical entity. The picture is that of a uveitis in the unoperated eye following an

extracapsular operation in the fellow eye. The first operated eye does not show any inflammatory reaction. The therapeutic approach in cases of sympathetic lens-induced uveitis is the prompt removal of the lens of the unoperated eye. This would seem to be a rather daring procedure in the face of an inflamed eye, but nonintervention leads to total loss of the eye.

737 Park Avenue (21).

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USE OF INTRAMUSCULAR TRYPSIN*

IN TRAUMATIC, INFLAMMATORY, AND HEMORRHAGIC OCULAR DISTURBANCES

JOSEPH M. HOPEN, M.D., AND FRANCIS N. CAMPAGNA, M.D.
Philadelphia, Pennsylvania

HISTORICAL

In 1932, John H. Northrop[1] and his colleagues at the Rockefeller Institute for Medical Research succeeded in isolating trypsin as a purified crystalline material.

In 1950, Reiser and his associates[2] used solutions of trypsin by injection into closed cavities to lyse viscous exudates. It was also used by inhalation to liquefy tenacious mucus.[3]

In 1952, Innerfield, et al.,[4] postulated that enzymatically induced anticoagulation, thrombolysis, and fibrinolysis followed intravenous administration of purified crystalline trypsin. Subsequent clinical studies,[5-8] based on the use of trypsin in more than 1,000 patients, gave evidence that trypsin rapidly suppressed acute inflammations of diversified origin, bacterial, viral, allergic, or chemical.

INTRODUCTION

In 1953, Hopen[9,10] reported an attempt to utilize the known proteolytic and anti-inflammatory properties of trypsin by using the drug intravenously in acute inflammatory and hemorrhagic ocular disturbances. It was observed that in a large percentage of the cortisone-resistant ocular cases, 79 percent, a prompt and sustained suppression of the acute inflammation resulted. However, following reports from several other investigators,[11,12] it was apparent that the intravenous use of trypsin was not an innocuous procedure.

In March, 1954, Hopen and Campagna[13] administered crystalline trypsin in sesame oil† deep intramuscularly in a series of diversified ocular conditions. The anti-inflammatory and thrombolytic effects of the intramuscular trypsin were apparent in the clinical conditions comprising this investigation. The results of this preliminary report encouraged these investigators to pursue further study on the use of trypsin in ophthalmologic pathology.

This study is of 63 patients and represents eight ocular pathologic entities in which inflammation, edema, and pain were dominant complicating factors as presented in Table 1.

* From the Philadelphia General Hospital.

† Parenzyme: Medical Research Department, The National Drug Company, Philadelphia 44, Pennsylvania.

Procedure of treatment

Dosage. The initial course of treatment consisted of 2.5 mg. of trypsin in sesame oil (0.5 cc.) injected deep intragluteally, using a dry sterile syringe, every eight hours for the first 48 hours, then every 12 hours for four days. The duration of treatment depended on the course of the disease; some patients required only six or seven injections.

Maintenance therapy. In chronic or recurrent ocular diseases, 2.5 mg. (0.5 cc.) of the trypsin in oil once or twice per week for several weeks frequently resulted in maximum satisfactory benefit.

Clinical results

The distribution of the 63 patients according to ocular pathology, and the results in each category, are as follows:

1. Extraocular trauma (20 cases)

Of the 20 extraocular trauma cases treated with trypsin in sesame oil, 16 had a very good response. Pain and swelling decreased in 48 hours or less. In four cases the results were equivocal.

Selected case report. I. B., a 27-year-old Negress, was struck with a fist in the left eye seven days prior to seeking medical attention in the eye clinic. The eye remained swollen (fig. 1). The patient was started immediately on intramuscular trypsin in sesame oil. After 24 hours there was noted subjective

Fig. 1 (Hopen and Campagna). Extraocular trauma. Before trypsin was started.

Fig. 2 (Hopen and Campagna). Same patient as in Figure 1, 24 hours after trypsin was started.

diminution of pain and marked objective decrease in swelling of the eyelids (fig. 2). Forty-eight hours later the eye was completely open. The patient showed only a slight residual subconjunctival hemorrhage remaining in the traumatized eye. The patient was discharged on the sixth day with the ocular condition completely resorbed.

2. Hyphema (postoperative) (six cases)

All six cases in this group had anterior chamber hemorrhage following cataract extractions. Treatment with trypsin produced a decrease in the hemorrhage within 24 to 48 hours in five of the six cases. Four cases were completely cleared in 72 hours, the fifth cleared in five days. There was one failure in this group.

Selected case reports

W. P., a 52-year-old Negress, diabetic, had a senile cataract removed from the right eye. A large anterior chamber hemorrhage was noted at the first dressing. Intramuscular trypsin was given, 2.5 mg. (0.5 cc.) each eight hours; after 24 hours the hemorrhage showed evidence of decreasing. At 72 hours it was completely absorbed.

I. R., a 71-year-old white woman, had a senile cataract removed from the right eye. At the first dressing a small anterior chamber hemorrhage was noted, it became progressively worse for the next two days. Intramuscular trypsin was started, and

TABLE 1

OCULAR CONDITIONS TREATED WITH INTRAMUSCULAR TRYPSIN

Diseases	Number of Patients	Number of Injections per Patient	Noticeable Improvement (average time)	Remarks
Extraocular trauma	20	12, 14, 10, 10, 12, 10, 10, 14, 14, 14, 10, 10, 10, 4, 6, 6, 6, 14, 21	24–48 hours	Pain and swelling decreased in 24 to 48 hours
Hyphema (postoperative)	6	6, 8, 13, 13, 9, 12	24–48 hours	4 cases hemorrhages gone in 72 hours, 1 case after 5 days, 1 case a failure
Uveal tract inflammation	6	6, 15, 42, 56, 8, 9	6 days	All cases cleared—one after 49 days
Retinal hemorrhages	3	14, 10, 21	7 days	Results equivocal
Vitreous hemorrhage	5			
1. Recent (1 day)		28	7 days	Excellent results—no residual visual or vitreal defect
2. Recent (9 days)		14	1 month	Cleared some—vision was light perception
3. Relatively recent (14 days)		30	3 weeks	Upper half of vitreous cleared. Good visual field inferior
4. Old (1 year)		21	Negative	No change
5. Old (several years)		30	Negative	No change
Inflammation (secondary)	3			
1. Acute ethmoiditis		14	48 hours	Excellent result following surgical drainage—equivocal trypsin effect
2. Acute retrobulbar neuritis		10	48 hours	Good result
3. Acute dacryocystitis		6	72 hours	Excellent result—no recurrence
Diabetic retinitis	18	14, 12, 16, 14, 14, 16, 13, 12, 14, 21, 14, 18, 16, 12, 13, 2, 14, 18	None	No apparent change in visual acuity or retinal picture
Intraocular infections	2	24, 14	None	Both cases required enucleation

within 24 hours definite improvement was observed. At 72 hours of trypsin treatment the hemorrhage was completely absorbed.

3. UVEAL TRACT INFLAMMATION (six cases)

Five of the six cases showed some improvement in one week or less. Of two cases which took the longest time to clear, one required six weeks and the second seven weeks to return to normal. All cases cleared.

Selected case report. W. R. S., a white man, member of the medical profession, had uveitis since 1938 when it lasted one month, again in 1945 for six weeks, 1951 for one month, and 1953 for 11 months up to time of present treatment. There was complete fogging of vision of left eye on awakening. Vision, 20/400 on February 19, 1954, continued 20/400 to September 11, 1954, when trypsin in oil via the intramuscular route was started—2.5 mg. (0.5 cc.) twice daily. On September 15, vision was 20/50 and trypsin was given once daily. On October 7, 1954, the patient developed severe generalized urticaria 15 minutes following trypsin injection. Treatment was discontinued. Vision has remained 20/50 at last examination, November 1, 1954, and the patient is grateful for the marked improvement.

4. Retinal hemorrhage (three cases)

The results in these three cases were equivocal—many more cases are necessary for positive evaluation.

5. Vitreous hemorrhage (five cases)

Of the five cases in this group, only two showed definite improvement which could be credited to the trypsin in sesame oil treatment. One case cleared completely in eight weeks and the other was partially cleared after four weeks. Two patients with chronic vitreous hemorrhage (one year and several years' duration) manifested no change in their conditions.

Selected case report. C. P., a 73-year-old Negress, diabetic, was referred by a former resident physician with a diagnosis of massive vitreous hemorrhage, right eye, of one-day duration. Fundus view of right eye was not possible because of vitreal hemorrhage.

The left eye was aphakic; fundus normal.

Visual acuity was light perception in the right eye, 6/15 in the left eye, with correction.

The patient was started on intramuscular trypsin, 2.5 mg. (0.5 cc.) twice daily. One week later she saw 6/60 in the right eye. Fundus examination of right eye was now possible and showed a resorbing hemorrhage in the vitreous.

Trypsin treatment was continued another week, at which time the patient's vision was 6/15 and further clearing of the vitreous was noted. Vision continued to improve so that on eight weeks of treatment, visual acuity in the right eye was 6/12+4 (same as the previous best acuity) and there was no evidence of previous hemorrhage in the vitreous. The patient has been followed for six months and maintained on one injection (2.5 mg.) of trypsin in oil at weekly intervals. No recurrence of hemorrhage has been observed to this time.

6. Secondary inflammation (three cases)

Two of the cases of acute retrobulbar neuritis and acute dacryocystitis had good results on trypsin in sesame oil treatment. The third case, with proptosis secondary to ethmoiditis, did not improve until surgical drainage was instituted.

7. Diabetic retinal hemorrhage

A. G., a 57-year-old Negress, diabetic, was seen in the eye clinic with the complaint of sudden dimness of vision in right eye. Fundus examination showed a retinitis in both eyes with what appeared to be fresh hemorrhage in the right eye. Visual acuity was 3/60, right eye, and 6/60, left eye. Trypsin in oil, 2.5 mg., was given intramuscularly twice daily for two weeks with little improvement, and was continued for three more weeks. Acuity improved to 6/30 in the right eye at this time, but funduscopically little improvement was noted.

8. Diabetic retinitis (18 cases)

Since one case of acute retinal hemorrhage in a diabetic patient apparently cleared following trypsin therapy,[13] the treatment was used in an attempt to clear old hemorrhages in diabetic patients.

There was no apparent change in the appearance of the fundi and no improvement in visual acuity in all 18 patients in this series.

9. Intraocular infections (two cases)

These were cases of endophthalmitis in which trypsin was used as an adjunct to antibiotic therapy. No improvement resulted and in both cases the eye had to be enucleated.

Selected case report. E. V., a 60-year-old white woman, was admitted with a diagnosis of bullous keratitis, right eye, and secondary endophthalmitis. She was immediately given large doses of antibiotics systemically and chloramphenicol by topical application.

Trypsin in oil was started simultaneously, since the globe was exquisitely tender. There was subjective improvement within 48 hours; however, objectively, the eye was unchanged. After 12 days, trypsin therapy had to be interrupted because the patient complained of severe pain following injection into the buttocks. Two days later a large hypopyon developed in the right eye, and the eye had to be enucleated soon thereafter.

10. Macular hemorrhage

J. H., a 30-year-old Negro, was struck in the right eye three days prior to admission. Fundus examination of the right eye showed a large hemorrhage in the macular area. Trypsin in oil was given intramuscularly, 2.5 mg. twice daily. The hemorrhage cleared very gradually without return to normal function. The patient was discharged after seven weeks with a large central scotoma.

Contraindications

Trypsin, either intravenous or intramuscular, should be used with caution in patients with blood-clotting abnormalities, impaired liver or renal function, acute pancreatitis, or with hemorrhagic states. The drug should not be used in patients with known sensitivity to parenterally injected oil.

Side effects

No toxic reactions have been reported, nor have we observed any, following the use of intramuscular trypsin. In our experience, 30 percent of the patients complained of pain at the site of injection, and in two patients it was severe enough to necessitate interruption of trypsin therapy. One patient experienced a generalized urticaria after the fourth day of treatment; treatment was stopped.

Since intramuscular trypsin acts only to reduce inflammation and seems to promote reparative processes, it should not be used as a substitute but rather as an adjunct to antibiotic therapy in the treatment of acute infections with marked inflammation.

Discussion

The mechanism of the action of intramuscular trypsin in modifying inflammation, edema, and alleviating pain has not been elucidated. It has been suggested that the trypsin activates a system of naturally occurring enzymes.[14] In small intramuscular doses, trypsin may function to re-establish or accelerate biologic continuity and to activate anti-inflammatory mechanisms.[6-8] Whatever the mechanism, clinical experiences attest to the effectiveness of trypsin in oil in the treatment of extraocular trauma, uveal tract inflammation, and in anterior and in some posterior chamber hemorrhages. Chronic ocular conditions such as intraocular infections, retinal hemorrhages, and diabetic retinitis were not responsive to this type of therapy.

Summary

1. The historical background for pure crystalline trypsin is reviewed.

2. The use of trypsin in ocular diseases is reviewed.

3. Procedure and treatment of ocular diseases is outlined.

4. Of 20 cases of extraocular trauma, 16 had a very good response, and in four cases the results were equivocal.

5. Of six cases of hyphema (postoperative), five cases were benefited and one case was a failure.

6. Of six cases of uveal inflammation, all cases cleared—four cases within two weeks, one case in six weeks, and one in seven weeks.

7. Retinal hemorrhages observed in three cases gave equivocal results.

8. Of five cases of vitreous hemorrhage, only two showed definite improvement. There was no change at all in two chronic cases.

9. Of three cases of secondary inflammation, two cases of dacryocystitis had gratifying results; one case of proptosis secondary to ethmoiditis improved following surgical drainage.

10. There was therapeutic failure in all 18 cases of diabetic retinitis.

11. Failure resulted in two cases of endophthalmitis; both cases had to submit to enucleation of the affected eye.

12. No toxic effects were observed; some pain at site of injection in about 30 percent of the cases.

13. One case of generalized urticaria occurred in the course of this study; it may have been coincidental.

Conclusions

Clinical experiences with trypsin in sesame oil attest the safety and effectiveness of this enzyme in those ocular conditions characterized by inflammatory reactions. Edema and acute inflammation readily respond to this therapeutic agent and pain is rapidly and effectively alleviated.

959 North Marshall Street.

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HEMATOMA OF THE ORBIT*

Report of two cases

Winston Roberts, M.D.
Winston-Salem, North Carolina

Among the infrequent space-occupying lesions which are encountered in the orbit, hematoma, or hematic cyst, is seen with surprising rarity. Reese, in his *Tumors of the Eye,* lists only five cases which include two reported by Wheeler and three by Awerbach. Ingalls, in his *Tumors of the Orbit and Allied Pseudo-Tumors,* also lists Awerbach's cases and mentions Michail's case occurring in a socket 10 years after enucleation, in addition to two cases which he analyzes. These last two cases are probably identical with the two reported by Wheeler. Duke-Elder in his *Textbook of Ophthalmology* notes 14 reports of "hematic cysts" which have been reported since 1880. These include the cases mentioned by Reese and Ingalls. It is striking that Benedict in his series from the Mayo Clinic and Reese in his extensive work with neoplasms of the eye and orbit have not encountered this lesion.

While it is evident from study of the cases reported that no specific clinical picture is produced by this type of lesion, certain recurring clinical factors are noted. Although trauma is by no means a constant factor, it certainly is part of the history in a number of the cases. The trauma may either be recent or in the rather distant past; it may be local injury to the region of the orbit or thoracic trauma with resulting increased venous pressure in the jugulars.

Symptoms may be abrupt in their onset or gradual over a period of many years.

A rapid course may be produced by recent injury or, apparently, by rupture of the hematic cyst, with acute increase in proptosis and associated chemosis of the conjunctiva and inflammatory swelling of the lids.

When the course is slow and insidious, there may be gradually increasing proptosis over a period varying up to 20 years. In such cases X-ray changes indistinguishable from those produced by true neoplasm may be found. These changes may be thinning of the bony wall of the orbit, as well as irregular, ill-defined defects highly suspicious of those produced by malignancy.

These tumors may show a typical dark color when bleeding is recent. In such cases, their presence may be suggested by visible discoloration of the lids or conjunctiva. To touch they may be either rather firm, smooth masses or definitely soft and fluctuant masses, depending upon the pressure within the hematoma cavity. Pain is not usual except when the contents of the cyst escape into the adjacent tissues and cause inflammation.

The pathologic structure of these masses consists of an outer fibrous layer lacking both epithelial and endothelial elements, an inner layer of granulation tissue rich in capillaries which may contain foam cells loaded with lipoids and cholesterol crystals, plus lymphocytes and polymorphonuclear neutrophils, and finally a hematoma cavity containing degenerated blood products and products of fat necrosis, with fresh blood present where recent bleeding has occurred.

In view of the paucity of reports on orbital hematomas, it is striking that two such cases should have been encountered on this rather small service within a period of three and one half years. The wide variation in the clinical picture which may be encountered is demonstrated by these two cases and the difficulty of differentiating them from neoplasms of the orbit and from pathologic

* From the Department of Ophthalmology, Bowman Gray School of Medicine.

conditions in the cranial cavity is also emphasized.

Case reports

Case 1

H. R. M., a 37-year-old white man, was first seen on January 11, 1950, complaining of feeling a growth in or around his right eye, with poor ability to close the eye, of at least two months' duration. He had also had a feeling that the eye was being displaced downward, and this displacement was noted by his wife.

His general health had been good except for nervousness. There was no definite history of recent trauma, although he remembered that many years ago he had received a rather severe blow by a baseball on the orbital rim but he had had no residual pain for some time. His wife felt that there had been some facial asymmetry for longer than the past two to three months, although it had become much worse in this period. In addition to his nervousness, the patient had noticed heat intolerance and occasional palpitations during the past two to two and one half years since his discharge from the army. He had also noticed when driving at night an occasional tendency for the white line in the center of the road to appear double but had had no other diplopia.

Admission examination revealed uncorrected vision to be: R.E., 20/30 − 2; L.E., 20/20. Wearing glasses, vision on the right was 20/20 − 2, and on the left, 20/20 + 3. Visual fields both on the perimeter and tangent screen were entirely normal.

The patient showed striking downward and forward displacement of the right eye. No lateral displacement was noted. The palpebral fissure was slightly narrower on the right than on the left. When the lids were closed, there was a sensation of a mass at the outer canthus in the right eye and, on eversion of the upper lid, the lacrimal gland presented prominently in the upper outer fornix as compared to the lacrimal gland on the left.

Exophthalmometer readings with the Luedde exophthalmometer were: R.E., 20 mm.; L.E., 17 mm.

X-ray studies of the orbit taken at this time showed marked destruction of both the medial and lateral aspects of the superior wall of the right orbit. The destruction appeared to be in continuity with the cavity of the right frontal sinus and extended well into the superior wall of the orbit. There was only a small superior remnant of the wall anteriorly. The findings were considered compatible with an invasive tumor.

The patient was admitted for surgery, and a basal metabolic rate was found to be minus three. Admission pulse was 88, and blood pressure 124/80 mm. Hg. General physical and neurologic examinations were essentially negative except for findings about the orbit. Funduscopic examination and nose and throat examination were entirely negative. Urine examination showed some red blood cells, and X-ray films of the abdomen showed opacities in the flank which were considered compatible with calculi.

Operation. On January 18th, the orbit was explored under sodium pentothal and ether anesthesia. A Benedict brow incision was made. As the periosteum was peeled from the underlying bone on the roof of the orbit, a dull, dark yellow, incapsulated tumor was encountered.

Dissection revealed that the tumor was approximately two to three cm. in width and at least three to four cm. in depth and extended back several cm. into the orbit. During dissection, the mass was ruptured and a large quantity of thick, yellowish to dark-brown fluid was expressed.

The cystic mass had eroded the superior orbital plate back to the midportion laterally and over to the roof of the frontal sinus medially, with marked thinning of the frontal bone which was very friable. No actual opening into the cranial cavity was encountered, although the thinning and friability of the bone was extreme.

After the mass was totally removed, the

periosteum and muscle were closed with catgut sutures and the skin was closed with black silk.

The pathologic report stated that the specimen was a typical organized hematoma containing old blood and pigment with evidence of recent hemorrhage. There was a definite fibrous-tissue capsule surrounding the cystic cavity which contained degenerated blood. No evidence of tumor was seen in any part of the specimen. Cultures were sterile.

The postoperative course was essentially smooth except for a mild flare-up of his urinary tract difficulty. In the early postoperative period, the patient had diplopia in his lower field of vision but, as the edema subsided, single binocular vision rapidly returned, and the eye rapidly receded to a position comparable to that of his other eye.

Since the time of the patient's hospital admission, his course has been entirely negative except for an episode of kidney colic for which he was hospitalized in June, 1951, for removal of a stone from his left kidney pelvis. Vision in the right eye returned to 20/15, and no perceptible difference in the lid apertures or position of the globes is present now. There has been no diplopia. Subsequent X rays of the orbit have been negative for any evidence of change. The patient is regarded as completely cured at this time.

Case 2

R. Y. D., a child, aged five and one-half years, was first seen October 20, 1953, on the neurosurgical service to which she was referred because of a bulging left eye. The parents had been aware of progressive bulging of the left eye for some eight weeks with rapid increase in the past week. During the two days before admission, the child had been complaining of pain, was listless and apathetic and somewhat irritable. Dark discoloration of the skin about the lids had also been noticed for two days before admission. There was a history of three different traumatic episodes. Seven months previously she had fallen from a moving automobile and suffered a concussion but, after about 48 hours, she seemed alert and subsequently had been quite normal. About one month later she was hit by a truck and had a fractured clavicle which again gave her little trouble. About nine weeks before admission she was struck on the forehead by a thrown rock but, at that time, did not seem to be seriously injured. The mother did not think much about it until the proptosis began about one week later. Past history was otherwise uneventful except for the occurrence of one convulsion with a febrile illness at about age four years.

On admission to the neurosurgical service the child showed a normal temperature, pulse of 120, and blood pressure of 90/60 mm. Hg. There was an extreme proptosis of the left eye which prevented complete closure of the lids, appeared to displace the globe laterally about five mm., and caused marked limitation of movement in all directions. Exophthalmometer readings with the Hertel exophthalmometer set at 96 were: R.E., 9., L.E., 21.

The left pupil was slightly larger than the right and reacted more sluggishly to light. Funduscopic was not remarkable at admission. Physical examination was otherwise negative.

Admission laboratory work was essentially normal except for a white blood count of 17,500. The possibility of retro-orbital hemorrhage was considered but was felt to be less likely than an orbital neoplasm. On the third hospital day a Diodrast angiogram was performed. Although there was somewhat unsatisfactory filling of the orbital vessels, it was felt that a definite large mass was indicated on the films.

Operation. On the following day, a transfrontal exploration was done by the neurosurgeons. When the orbit was unroofed, the orbital contents appeared to be grossly normal except for a somewhat greenish-appearing cyst located on the medial side of the

orbit and measuring approximately two-cm. deep and one-cm. wide.

This was aspirated and found to contain old blood. The cyst wall was thought to resemble the wall of a hematoma. It was dissected free and removed, although a small tag of the wall may have been left. Just anterior to the cyst, a blue mass, which appeared to be either a venous sinus or a more recent hematoma, was encountered and opened. Hemostasis was obtained by electrocoagulation and packaging with gelfoam. The dura was tacked to periosteum over the orbital roof, and the frontal lobe and bone flaps were replaced. At the termination of the operation, the left eye had receded to near-normal, and the left pupil had become smaller than the right. A tarsorrhaphy closed the lids at the end of the orbital exploration.

The pathologic report described the cyst wall as a connective-tissue, membranous structure, a description consistent with that of a hematoma wall.

Postoperative course. For three days the child got along very well, but on the fourth day there was a marked increase of swelling about the orbit, chemosis of the conjunctiva, and protrusion of the globe. The child also developed fever up to 104.6F. Consequently the orbit was re-explored through the previous site of incision.

The area of the hematoma was again found to contain several cc. of old blood; however, even after this was removed the orbital contents still appeared grossly hemorrhagic, edematous, and, in the lower posterior aspect, covered with some thick, pinkish-looking material which was smeared and cultured and found to contain hemolytic Staphylococcus aureus. Repeat biopsy taken from the contents at this time revealed only orbital fat with hemorrhage and acute inflammatory reaction.

Subsequently the child was given intensive therapy with penicillin, streptomycin, chloramphenicol, and then erythromycin when the organism was found to be most sensitive to this antibiotic. Her course was somewhat stormy, with swelling of the orbital contents becoming increasingly severe for several days after the second operation. The conjunctiva prolapsed and eventually a crust developed on the prolapsed inferior conjunctiva. Light reflex in the left eye was also lost in the first postoperative week.

After about two weeks the child began to show steady improvement, becoming afebrile. The orbital swelling gradually receded. The eye showed total lack of mobility for approximately four weeks when it began to show slight return of motility. At discharge, on December 7th, the eye was approaching a normal position although there was still marked limitation in motility and an almost complete ptosis.

Following discharge the eye has become increasingly normal until, at the present time, the patient is showing only ptosis and palsy of the superior rectus in the left eye with virtually complete return of motility otherwise. The eye shows advanced optic atrophy, however, and is totally blind. The postoperative course has been complicated by one grand mal epileptic seizure in early July, 1954. It is felt that this was probably due to scarring subsequent to her transfrontal exploration and infection. She was put on barbiturates and has had no further seizures.

Comment

The wide difference both in clinical picture and degree of ultimate damage which can be produced by hematoma of the orbit is well displayed by these two cases. Case 1 particularly demonstrates how well these lesions may simulate true neoplasms, both by their insidious development with no good history of trauma, by the presence of a palpable mass, and by X-ray changes entirely compatible with those produced by an invasive tumor. Despite the actual bone destruction found at surgery, this case is an example of the complete recovery which may be obtained following operative removal of the hematoma.

The second case, by contrast, exhibits the

fulminating course which may be produced by hematoma of the orbit. In retrospect it would appear that the actual diagnosis might have been given greater consideration than it was, in view of the numerous traumatic episodes in the recent history, the dark discoloration of the skin of the lids which had been noted in the two or three days before admission, and the rapid, progressive bulging of the left eye within the week before admission. Case 2 also shows how difficult it may be to find and control the source of bleeding causing the hematoma in the orbit, especially when so acute. In this case, the hematoma mass recurred despite careful examination and packing through the good exposure given by a transfrontal approach. This case also demonstrates how stormy the postoperation course can be and how unsatisfactory the outcome. Whether any more favorable result could have been obtained if orbital infection had not developed following surgery is a matter for speculation.

Summary

1. The clinical features of the rare orbital space-occupying lesion, hematoma, are presented and the few cases previously reported are listed.

2. Two additional cases of the hematoma of the orbit are reported and discussed.

Bowman Gray School of Medicine.

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CRYPTOPHTHALMIA*

Sheldon Zinn, M.D.
Chicago, Illinois

Cryptophthalmia was first introduced by Zehender,[1] in 1872, to denote a rare congenital anomaly of the eye in which there is an absence of the lids associated with a metaplasia of the normal corneal epithelial tissue into a tissue resembling skin. His case showed a total absence of the eyelids and their appendages; the eyebrows, the lacrimal glands, and ducts were absent. The orbital area on the face was covered by skin continuous from forehead across the orbit and extending to the cheek. Zehender believed that the absence of the lids prevented the formation of the conjunctival sac and he noted that the skin was connected with the surface of the eyeball by a subcutaneous cellular membrane. Manz[2] made a histologic examination of the globes in this case and he noted several abnormalities. These included an imperfect development of the lens and the filling of the anterior chamber with vitreous.

v. Duyse,[3] in 1889, described the second case on record, which also presented an absence of lids and skin covering the region of the orbit in a manner similar to that described in the above case. In this patient, there was also an imperfect development of the parietal bone associated with a meningoencephalocele.

Treacher Collins[4] discussed these two cases

* From the Division of Ophthalmology of the Department of Surgery, The University of Chicago. I am indebted to Dr. William M. Jones, Chicago, for the specimen.

before the IV International Congress of Ophthalmology in 1900 and told of finding a case of cryptophthalmos in a chick that was the offspring of a rooster that had fathered other anomalous chicks. Collins in his discussion stated that the failure of lid formation left no protection to the globe of animals not living in a fluid medium like fish, consequently, the epithelium covering the surface of the eyes became desiccated, with tissue similar to that of skin being formed in front of them.

Since the appearance of these two cases, there have been few other cases reported. In the English literature, Walter Sinclair[6] presented a case of bilateral cryptophthalmos with no pathologic report. He was able to feel the eyeball move beneath the skin and noted that a bright light concentrated over the region of the eye caused wrinkling of the skin, suggesting that light perception was intact and also the presence of an orbicularis muscle.

D. H. Coover[6] of Denver reported two cases; that of a mother and child, bilateral and identical in each case. He thought the cases presented a condition of fusion and disorganization of the lids but an attempted separation of this tissue failed to reveal normal cornea. He described two rows of hairs about midway between the lower margins of the upper lids and the margins of the orbits. This is interesting because other investigators report that cilia are never to be found in this condition. There was no pathologic report. Key[7] also presented a case in this country, of the clinical findings only, in 1920.

Parsons[8] gives a résumé of the pathology of seven cases, all that were reported up to his day. He said that the eye is invariably disorganized; eyebrows have been present in the majority of cases; eyelashes are invariably absent but there has usually been some indication of a palpebral fissure with the ocular muscles well developed. The last case in the literature at the time of this report is that of Ghosh[9] of India, 1952.

Report of case

The patient, a 22-month-old Negro male, was born full-term with the following defects: (1) right frontal meningo-encephalocele, (2) absence roof of right orbit, (3) lateral displacement right orbit, (4) congenital absence palpebrae, right, (5) leukoma, right cornea (cryptophthalmia), (6) right complete cleft palate, right unilateral hair lip.

There was a family history of congenital deformity present in a paternal uncle. The exact nature of this deformity was unknown. The mother of this infant had a positive serology in 1946 and underwent complete treatment. Two siblings were living and well. At the age of three weeks a repair of the hair lip was performed uneventfully. At six months of age a Diffenboch-Warren procedure for cleft palate was performed uneventfully. At 22 months of age a secondary closure was done and the patient died suddenly in the first postoperative day. Neurosurgical repair of the meningo-encephalocele had been contemplated. The right eye was obtained at autopsy.

Gross examination

The specimen was a right bulbus oculi displacing six cc. of alcohol, with firmness of a soft rubber ball, and with diameters: vertical, 21 mm., horizontal, 22 mm.; anteroposterior, 23 mm. Cornea: nine mm. vertical, 11 mm. horizontal. The conjunctival collarette was difficult to identify. The cornea had a dull, white color. Along the entire superior periphery was a wrinkled deflated bleb, three mm. vertically, eight horizontally. Most of this area was covered by a darkly pigmented, thin membrane. Muscles were difficult to name with certainty.

Histopathology

The major pathologic finding is present in the epithelial structure of the cornea. The cornea is covered by a keratinizing epithelium many cell layers thick (6-12).

There is a somewhat irregular ingrowth

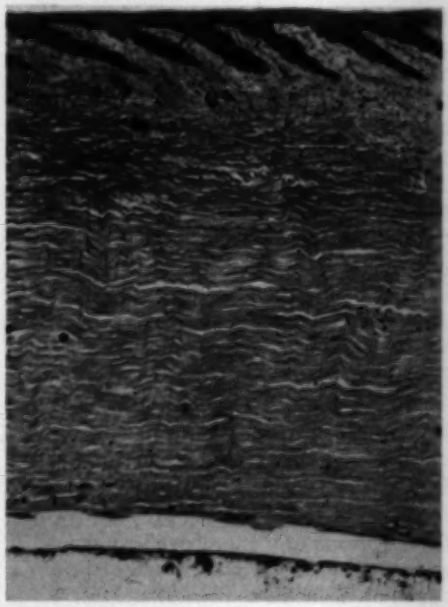

Fig. 1A (Zinn). There is a somewhat irregular ingrowth of the deeper portion of keratinizing epithelium into the deeper structures.

of the deeper portion of this epithelium into the deeper structures in a rete peglike formation (fig. 1A). The deeper cells of this epithelium contain a considerable amount of melanin. They are somewhat spindle in shape and comprise approximately two to three rows of the deepest of the epithelial cells (fig. 1B).

Fig. 1B (Zinn). The deeper cells of this epithelium are somewhat spindle-shaped.

Lying upon these cells are nonpigmented cells, more spindle in character. No prickles or intercellular bridges can be made out. They contain very indistinct nuclei and become much more flattened as the surface is reached. At the surface, the cells are without nuclei and consist approximately of six layers of very flattened anuclear cells.

Near the limbus, there is a very abrupt transition of the flattened epithelial cells into large cells containing considerable cytoplasm and very large nuclei (fig. 2). The cellular outline of these cells is seen only with the greatest of difficulty and one gets the impression that they are hexagonal in outline. These cells are approximately in 12 layers and are also covered by keratinized surface.

There is no gradual transition into the surface, however, as was present in the

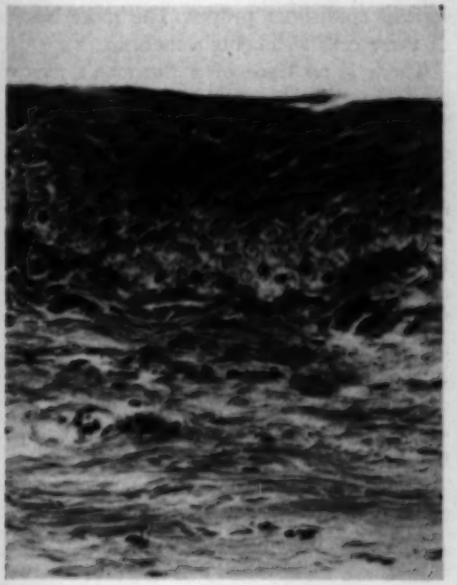

Fig. 2 (Zinn). Near the limbus there is an abrupt transition of the flattened epithelial cells into large cells containing considerable cytoplasm and very large nuclei.

corneal epithelium proper. The most basal of these cells also contain melanin.

There is no trace of a Bowman's membrane beneath this epithelium. The epithelium lies on a rather dense fibrovascular tissue which corresponds closely to corium. This tissue fades gradually into what is more normal-appearing corneal lamellae. The anterior fourth of the corneal thickness is vascularized. There is no evidence of inflammation present.

The remainder of the cornea presents nothing remarkable. The keratinized epithelium can be followed far back on either side of the cornea to a point well back on the sclera (fig. 3). The remainder of the eye is that of a young, highly pigmented eye, essentially normal, except for extensive postmortem changes in the retina and the above-described pathology of the epithelium and cornea.

Comments

The lid folds, both upper and lower, form in the 16-mm. stage of the embryo. These folds differentiate and extend so that adhesions between the upper and lower lid form at the 31-mm. stage to cover the globe. Very shortly following this stage follicles of the eyelashes begin to appear in the lid margins.

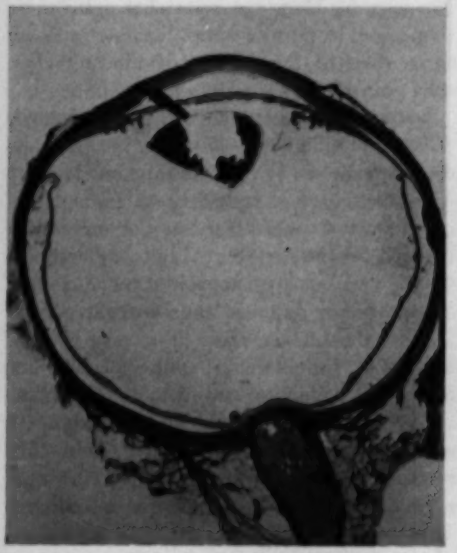

Fig. 3 (Zinn). The keratinized epithelium can be followed far back on either side of the cornea.

Mayou[10] feels that the absence of lashes present in cryptophthalmos indicates that the lid folds never formed and fused, thus giving rise to the follicles of the cilia. He implies that cilia should be present in each case of cryptophthalmos if it were due to a failure of the normal separation of the lids at about the sixth month of fetal life. This case shows no evidence of either follicle or meibomian gland formation in the skinlike structure on the cornea. Mayou also finds support in his theory in the fact that, in cases of notches of the eyelids in which the apposition of the lids have been defective during fetal life, dermoid patches are often found upon the conjunctiva.

Both Ida Mann[11] and Duke-Elder[12] give excellent accounts of the possible explanations for this congenital deformity. Ida Mann states that, in a few cases, remnants of lid glands were found and thus it is possible that two types of cryptophthalmos exist, the one due to an initial failure of the lids to form and the other to a subsequent "destruction or absorption of the conjunctiva." These cases also show no lashes. Mann feels that some cases of cryptophthalmia may be explained on the basis of an ankyloblepharon by ankylosis. Most authors feel, however, that the primary cause is a failure of the lid folds to form.

Figures 1A, 1B, 2 and 3 show the epithelial changes that are characteristic of skin. The basal cells are columnar in shape and lie with their long axis vertical to the dividing line between epidermis and corium. The intercellular bridges normally present are not visible in these photographs but they might be demonstrated if the specimen were fixed immediately in Zenker's fluid and stained with phosphotungstic acid-hematoxylin. The

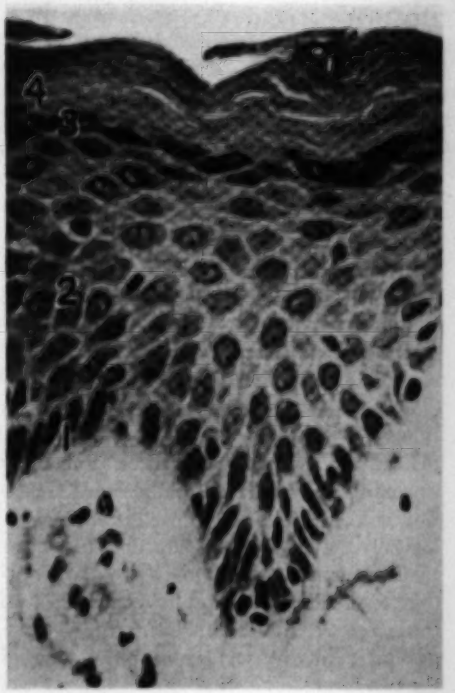

Fig. 4 (Zinn). Normal epidermis from the dorsum of the hand: (1) Basal layer. (2) Stratum malpighii. (3) Granular layer. (4) Horny layer.

clear cells of Masson which are normally scattered throughout the basal-cell layer in the skin and which are capable of changing into dendritic cells under certain types of stimuli are not seen; however, with special type staining, these different types of cells might also possibly be demonstrated, for it is necessary to demonstrate dendritic cells with Block's dopa stain. The stratum malpighii or prickle cell layer form their characteristic mosaic. A granular layer also appears to be present and a horny layer is quite evident.

Figure 4 shows normal epidermis from the dorsum of the hand: (1) basal layer, (2) stratum malpighii, (3) granular layer, and (4) horny layer.

Summary

A case of cryptophthalmos is presented in an infant with numerous other congenital anomalies. A brief résumé of some historic aspects of this rare anomaly is presented. Brief notes on the pathogenesis are made and the histologic characteristics of the epithelial metaplasia are noted.

950 East 59th Street (37).

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COMPARATIVE TONOGRAPHIC STUDY OF NORMOTENSIVE EYES OF WHITE AND NEGRO PERSONS*

B. Boles-Carenini, M.D., R. E. Buten, M.D., W. M. Spurgeon, Ph.D., and K. W. Ascher, M.D.
Cincinnati, Ohio

Opinion is divided concerning a predilection of Negroes for glaucoma. Elliot[1] and Ball[2] stated that Negroes are particularly susceptible to this disease. Duke-Elder[3] and Sugar,[4] however, agree in denying any racial predisposition to glaucoma, except possibly for some localized ethnic groups such as the population of a region in Turkestan where, according to Pilman[5] (1927), the incidence of glaucoma would be about 15.7 percent of all eye diseases, while in Africa, Europe, and the United States it is about one to two percent. Gradle[6] and Weinstein and Forgacs[7] report a possible predisposition of Jewish people without mentioning any other racial predilection. Rouse,[8] having found glaucoma in 54.1 percent of white patients and in 45.9 percent of Negro patients in a clinic where more than half of all patients were Negroes, believed that the disease is not more common in Negroes. McNair[9] arrived at the same conclusion after evaluating the answers to questionnaires sent to 125 ophthalmologists in different parts of the United States: 33.9 percent of the doctors who answered believed that glaucoma is more common in Negroes, while 66.1 percent did not think so.

A predisposition of highly pigmented eyes for glaucoma was mentioned by several authors. Lange[10] (1887), though doubting the assertions of Rydel, Rosas, Sichel, and von Arlt[11] that glaucoma more often affects dark eyes, thought that the explanation could be found in the fact that an iris, richer in pigment and therefore thicker, can more easily occlude the angle of the anterior chamber.

Scott[12] studied the eyes of 2,000 Negroes of Western Africa and compared them with the eyes of European people. He found that the most important difference is in the pigmentation and in the necessity for stronger mydriatic drugs to dilate the pupil.

One might think that a possible predilection of Negroes for glaucoma could be explained by anatomic differences. Venable,[13] assuming that such do exist, seriously questioned whether the Negro eye differs physiologically: studying clinically 30 Negro patients by gonioscopy, perimetry, and provocative tests he found results comparable to those for the Caucasian race, strongly suggesting similarity of ocular physiology in the two races.

Venable's conclusions are well in agreement with recent clinical experiences reported by Kronfeld in a personal communication revealing no statistically significant difference between white and Negro persons in the incidence of glaucoma. However, more pigment being present in the Negro eye, pigment granules may more readily be deposited in the trabecular meshwork, in the canal of Schlemm, and in its outlets, causing an obstacle to aqueous outflow.

The purpose of our work was to determine, with the aid of an electronic tonometer, whether there are any differences in intraocular pressure (IOP), facility of outflow (c), and production of aqueous humor (K), between normotensive eyes of white and Negro persons. In other words, we have looked for a possible difference in the aqueous humor dynamics of Caucasians and Negroes.

One hundred and seven white persons, representing a total of 203 eyes, and 97

* From the Department of Ophthalmology, College of Medicine, University of Cincinnati. This study was aided by United States Public Health Grant B-158. Presented at the meeting of the East-Central Section of the Association for Research in Ophthalmology, Buffalo, New York, January 10, 1955.

Negro subjects (187 eyes) were studied. Of the white subjects, 52 were female (100 eyes) and 55 were male (103 eyes). Of the Negro subjects, 45 were female (86 eyes) and 52 were male (101 eyes). All persons were between 40 and 92 years of age. All eyes were free of manifest ocular disease.

It was, of course, impossible to determine the percentage of Negro blood in our subjects. We did take the precaution of selecting subjects with very dark skins, because their eyes are richer in pigment. We believe that our Negro examinees are representative of the typical American Negro.

We performed tonography on each eye, using a Mueller electronic tonometer without a recording attachment. The technique used was the standard one described by various authors, with all the precautions recently outlined by Stepanik.[14] We preferred to use a light nonmagnetic lid retractor. The values were recorded every 30 seconds; the total duration of each tonometry was four minutes. The facility of outflow was calculated from the formula:

$$c = \frac{V_\Delta}{(A_v\ P_t - P_o)\ t}$$

and the rate of production of aqueous humor from the formula

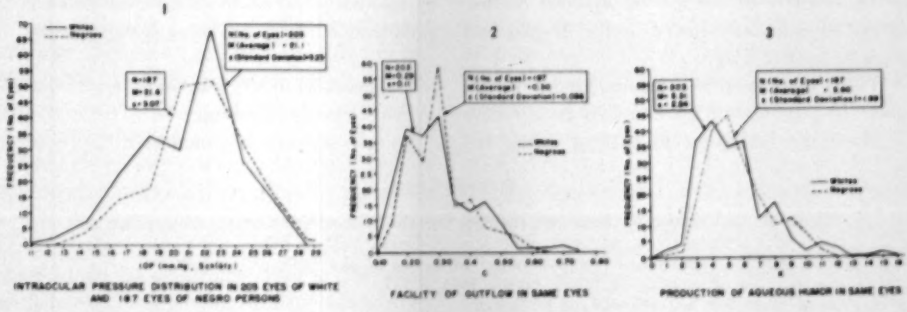
$$K = P_o \times c$$

For interpretation of these formulas, the reader is referred to Grant's original papers.[15,16]

All our data were evaluated statistically, using the F test of Snedecor and the t test of Student. First we compared the values of IOP, c, and K of the eyes of the white and Negro persons studied. In Graphs 1, 2, and 3 are shown the curves of distribution for IOP, for c, and for K of these two groups with the relative average values (M) and standard deviation (s). Comparing our data with the appropriate values from the F and t tables, the difference between the samples turned out to be attributable to chance: In other words, no significant difference between IOP, c, and K of normotensive eyes of white and of Negro persons exists.

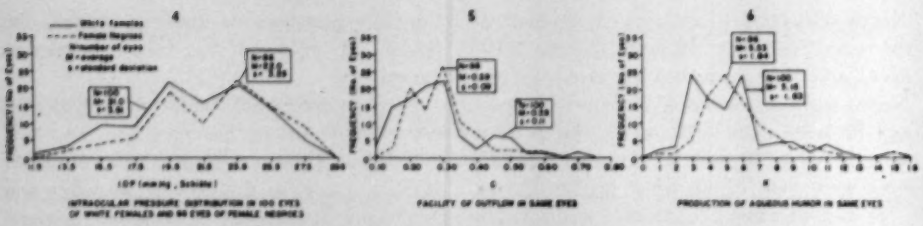
The second statistical evaluation concerned comparison of values of IOP, c, and K for eyes of Negro women and white women. In Graphs 4, 5, and 6 are shown the curves of distribution for these two groups.

Lastly, the same statistical analysis was done on the values of IOP, c, and K for the eyes of white and Negro men. The pertinent curves of distribution are shown in Graphs 7, 8, and 9. The calculations and the values for the F and t tests proved that all data were homogeneous for both female and male groups: IOP, c, and K of the eyes of Negro

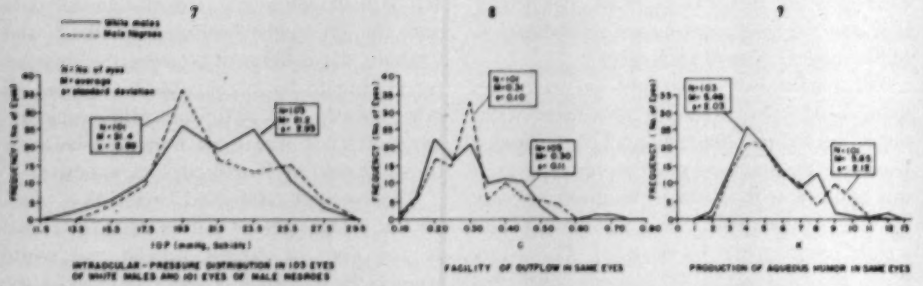


THERE IS NO SIGNIFICANT DIFFERENCE BETWEEN NEGRO AND WHITE PERSONS IN EYE PRESSURE, PRODUCTION AND OUTFLOW FACILITY OF AQUEOUS HUMOR. THIS DISPROVES THE ASSUMPTION OF A POSSIBLE PREDILECTION OF THE NEGRO EYE FOR GLAUCOMA

Graphs 1, 2, and 3 (Boles-Carenini, Buten, Spurgeon, and Ascher). Comparative tonographic study of normotensive eyes of white and Negro persons. (Lists of the original data are available upon request.)



Graphs 4, 5, and 6 (Boles-Carenini, Buten, Spurgeon, and Ascher). Comparison of the eyes of women of the two races.



Graphs 7, 8, and 9 (Boles-Carenini, Buten, Spurgeon, and Ascher). Comparison of the eyes of men of the two races.

women do not significantly differ from those of the eyes of white women. The same is true for male subjects, white and Negro.

Our investigations proved that:

There is no significant difference between intraocular pressure of normotensive eyes of Negro and of white adults.

The facility of outflow of aqueous humor is not significantly lower in the Negro eye than in the white eye.

The production of aqueous humor is the same in the eyes of members of both races.

Since the resistance to outflow is the reciprocal of the facility, we conclude that the eyes of Negroes do not present an increased resistance to outflow, as compared to that of Caucasians. The eyes of persons of the white and Negro races differ anatomically but the dynamics of the aqueous humor are equal in both. Therefore, it seems impossible to maintain the assumption that there is a predilection of Negro eyes for glaucoma.

Department of Ophthalmology,
College of Medicine,
University of Cincinnati.

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SHOCK GLAUCOMA*

JOHN A. EGAN, M.D.
Denver, Colorado

Although nearly all ophthalmologists admit the important role played by trauma and the emotions in the incidence of glaucoma, very few reports have been published in the literature describing specific cases in which these factors seem to be apparent.

In my experience, those cases of glaucoma caused by emotional trauma or distant physical trauma, which in effect may be the same thing, have occurred in eyes with shallow anterior chambers. In this paper, when I speak of shallow anterior chambers, I refer to that type which is so shallow that it simply cannot be missed if one examines the eyes at all closely.

Duke-Elder[1] states that attacks of glaucoma are ". . . *infrequently* induced by conditions which upset the vasomotor balance and are particularly associated with worry, sleeplessness, fatigue, or constipation . . ." It will be noted, however, that he does not mention injuries as an exciting cause. Naturally, though, injuries may produce worry, sleeplessness, and all manner of emotional disturbances.

Inman[2] wrote of acute glaucoma and its appearance following emotional distress of which the patient may be totally unaware. He cites the case of a patient developing an acute attack of glaucoma after a discussion with his son concerning the son's life after the father's (patient's) death.

According to Schoenberg,[3] writing about glaucoma caused by anxiety, "Mental and emotional conflicts, whether conscious or buried in the unconscious, may produce a disturbance of physiologic processes and even cause reversible or irreversible organic lesions." He cited a patient who suffered a broken knee and concussion of the brain, followed in a few months by symptoms of glaucoma.

He further states that ". . . the cerebral cortex, the thalamus, and the hypothalamus (which contain the highest centers of the autonomic nervous system), together with the pituitary body and the adrenals, form one unit within which the extremely complex phenomenon of emotions is developed and from which, by the aid of nerve pathways and hormones, the emotions are transmitted throughout the entire organism."

Commenting upon the same subject, Posner and Schlossman[4] stated, "In the light of present knowledge, primary glaucoma is regarded as a single disease in which the primary or predisposing cause consists of a dysfunction of the central regulatory mechanism and in which various anatomic and physiochemical conditions of the eye are modifying and precipitating factors."

Discussing McDonald's paper[5] on malignant glaucoma, Tassman says "The emotional state of the patient can be an important factor in the occurrence of glaucoma in the second eye. . . . I have seen cases in which operation was performed for glaucoma in the one eye and an acute attack developed in the second eye before discharge

* Read at the Postgraduate Course in Ophthalmology and at the summer convention of the Colorado Ophthalmology Society, 1954.

from the hospital. In another instance, the patient suffered an acute attack of glaucoma in one eye while still hospitalized after removal of the gall bladder."

It has been my fortune in the past several years to see four patients who almost immediately noticed eye symptoms after a fall. I believe this experience unique enough to report.

Case reports

Case 1

M. O., a white woman, aged 82 years, in good general health, was first seen at home on May 21, 1950. She gave a history of an operation for glaucoma, left eye, in another city several years before with subsequent total loss of vision. Since then she had noticed a gradual loss of vision in the right eye. Thirty-six hours prior to my visit she had fallen on the bathroom floor. Since then her vision had become rapidly and progressively worse.

Upon examination she was found to have a red right eye with circumcorneal flush, a very shallow anterior chamber, and a senile cortical cataract, moderately advanced. Vision was light perception only. The eyeball was very hard and the tension would not register on the Schiøtz tonometer. She was transferred to a hospital where, with various procedures including intravenous Sorbitol, her tension was reduced to 40 mm. Hg in three hours. The following morning the tension was 27 mm. Hg and she was allowed to go home with a prescription for pilocarpine (four percent) eyedrops. Her vision, which never improved after the first 24 hours, was 20/200. Her left eye showed all the evidence of absolute glaucoma and no light perception.

She did well on the drops twice daily and lost little or no vision over a period of 18 months. She refused surgery for the cataract.

On November 8, 1952, I was again called to her home because of a fall down her front steps followed by loss of vision in her only eye, the right, as before. She was again hospitalized with a tension so high that it would not register. This time there was some question whether she had even light perception. The usual emergency procedures were carried out for about four hours, but only a paracentesis finally lowered the tension. The following day the eye registered an intraocular pressure (Schiøtz) of 75 mm. Hg and the vision was no better. She was taken to surgery and a wide basal iridectomy was done followed by an intracapsular cataract extraction. Her eye healed without incident and today has corrected vision of 20/200. Her tension is normal with no medication.

Emotionally this patient was quite a stolid individual. She appeared not to worry about the possible loss of vision in her only eye. In fact, she lay in bed during the first attack, practically sightless, and resisted efforts of her family to provide eye care.

Case 2

W. C., a white man, aged 65 years, a chiropractor, reported to my office February 2, 1954, with a complaint of difficulty in seeing far and near. He stated that three months previously he had fallen down while getting out of his car and had suffered a rather severe contusion of his right knee. In the next 24 hours he noticed onset of his eye symptoms—a diminution in vision but no pain or other acute symptoms.

His vision corrected was: O.D., 20/40; O.S., 20/40−1. His tension was 40 mm. Hg in each eye and he had bilateral cataracts, senile, cortical, moderately and about equally advanced in maturity. His anterior chambers were noticeably shallow.

This patient has not returned since his first brief examination. He casually dropped into the office without an appointment.

Enough examination was done to determine that he had two serious eye conditions, either of which could blind and completely incapacitate him. This was explained to him and he was urged to return for a refraction and further examination. After making two different appointments during

the following week, he cancelled them both and never has returned. From this, one would guess that the emotional state of this patient did not constitute a significant part of his trouble.

CASE 3

M. S., a white woman, aged 62 years, reported to my office August 3, 1953, complaining of pain and loss of vision in the right eye. Her trouble had started 24 hours before when she had fallen over a footstool in her home, bruising her right shoulder severely. She had never had any eye trouble before.

Upon examination, both eyes showed shallow anterior chambers. Vision corrected was: O.D., 20/100; O.S., 20/20. The right eye was hyperemic with a ciliary flush and some edema of the cornea. In spite of massage with glycerine and a glass rod, the fundus could not be seen clearly. Tension was 65 mm. Hg, O.D.; 27 mm. Hg, O.S. The left eye was white and quiet. Incipient cataracts were noted, worse in the right eye.

A diagnosis of acute glaucoma, right eye, was made and the patient was hospitalized. Routine emergency measures to lower the intraocular pressure were carried out, but 24 hours later the tension was still 45 mm. Hg. Therefore, a broad basal iridectomy was performed and the patient has done very well since then without drops. Incidentally, the tension in her left eye has come down to 22 mm. Hg but the eye has a shallow anterior chamber. It is impossible to see the angles in either eye with an Allen goniolens except where the iris is removed.

This woman was a rancher's wife and diabetic. She appeared to take her eye disease philosophically and did not seem to be inclined toward nervousness.

CASE 4

A. R., a white woman, aged 65 years, was first seen in my office August 18, 1950, for a routine eye examination. Her vision was: O.D., 20/20+; O.S., 20/30, with a +1.0D. correction each eye.

Because of extremely shallow anterior chambers her tension was taken in spite of the fact that the eyeballs seemed soft to the finger test, although the left globe gave noticeably more resistance. Tension measured: O.D., 16 mm. Hg; O.S., 25 mm. Hg. Provocative tests were then done; water and coffee, and one hour in the dark room. Following these tests her tension measured 25 mm. Hg in each eye. Repeated later tests were always within normal limits, although there was always an 8.0 to 10 mm. Hg spread between the tensions of the two eyes, repeatedly higher in the left eye, prior to the tests.

There was questionable bilateral cupping and incipient, senile, cortical cataracts, worse in the right eye. Examination of the angles showed they were narrow but open. The patient was informed that she was a glaucoma suspect, that she should report for tension readings every three months. She did this religiously, and my last note on her —May 5, 1953—shows corrected vision: O.D., 20/70−1; O.S., 20/25−1; tension: O.D., 15 mm. Hg; O.S., 23 mm. Hg.

For the remainder of the record I am indebted to Dr. Paul A. Wenzel who treated this patient later.

On August 28, 1953, she fell, breaking her hip. She was hospitalized and 24 hours later developed pain in the right eye. The tension was 63 mm. Hg. The eye showed all other manifestations of acute glaucoma. The left eye was quiet and the pressure normal.

All measures to bring down the tension failed, and on August 29, 1953, a wide basal iridectomy was done followed by an intracapsular extraction of the cataract. These procedures brought the tension to normal, and the eye healed well without incident.

On September 9, 1953, an open reduction of the hip fracture was done. Twenty-four hours later, in spite of the fact that pilocarpine was being used in the left eye as a preventive, the eye became acutely glauco-

matous with a tension of 65 mm. Hg. The following day a wide basal iridectomy was done. The eye healed without incident and the tension remains normal in each eye today.

This patient was the only "worrier" of the group. She was always quite apprehensive, afraid she would lose her vision entirely. She also worried considerably about monetary matters.

Discussion

These patients had several things in common in addition to all being past the age of 60 years. For instance, they all had noticeably shallow anterior chambers. They were all hypermetropic. They all had cataracts and, of course, all had sustained injuries. They all had acute eye symptoms which, apparently, were no different from those seen in hundreds of other attacks of acute glaucoma. Only in Case 2 were congestive symptoms absent.

The difference in these cases is that the attacks were all induced by physical shock. I believe, however, that emotional shock could be just as efficient in precipitating an attack; however, clearcut cases are difficult to find. As we discover more and more about glaucoma these cases may even constitute a separate type of glaucoma. Until more facts are known, I shall term this condition "shock glaucoma." Perhaps all acute congestive glaucoma should come under such a heading but, so far as I know, no such a conclusion has yet been published.

Many abnormal conditions are probably present in the eyes of older patients; for instance, a shallow anterior chamber. As a matter of fact Rosengren[6] demonstrated in his work that the depth of the anterior chamber decreases with advancing age. A shallow chamber does not invariably indicate a narrow angle.[7] It does, however, predispose such an eye to glaucomatous increases in pressure of an acute or chronic nature. Possibly such an eye is also hypermetropic, therefore shorter and smaller than normal. If such an eye became glaucomatous, its corneal diameter would probably be less than 11.5 mm.[8] In any event, the lens probably would also be disproportionately large.

We know that generally the diameter of the lens increases with age.[9] From the age of 20 to 29 years, the average diameter is 8.67 mm., from 60 to 69 years, 9.49 mm., almost one mm. difference. During the same years the lens has been found to thicken sagitally, almost one mm., from 4.0 mm. to 4.77 mm. Therefore, as age advances the lens not only becomes larger and weighs more but also occupies more volume.

The remarkable thing is that more older hypermetropes do not develop acute glaucoma, especially those with cataracts which also increase the size of the lens. Indeed, the incipient cataracts in all the cited cases may have been the indirect cause of the attacks. The likelihood of this possibility increases when we realize that, in many cases, anterior displacement of the lens causes the anterior chamber to become more shallow as age advances.[7] In Case 4, the first attack of glaucoma occurred, not in the eye which had been demonstrating the higher pressure, but in the eye with the more advanced cataract.

Some of the purely anatomic conditions which may play a part in shock glaucoma have so far been discussed. Physiologically, too, many conditions conspire to produce acute glaucoma. For instance, Davson states[10] that adrenalin in low concentration (1/10,000) causes dilatation of the small vessels and consequent increase in the diameter of the capillaries, with a resulting increase in intraocular pressure. In addition, we know that adrenalin is secreted to the blood stream in times of physical and emotional stress and that it raises the blood pressure, if indeed the blood pressure is not already higher than normal, as is so often seen in persons over the age of 60 years. And high blood pressure in itself is said to raise the intraocular pressure slightly. I regret that I do not have the blood pressure readings of the patients described.

Histamine, as we all know, is a powerful capillary dilator and can cause a large rise in intraocular pressure. Friedenwald showed that congestion of the anterior uvea due to histamine may cause attacks of acute glaucoma. We know that, in cases of physical trauma, histamine is present in the circulating blood. While I have not been able to find any evidence in physiologic literature that the same condition obtains in emotional trauma, the possibility certainly exists. It is possible that histaminelike amines may increase the intraocular pressure.

In his animal perfusion experiments Duke-Elder has shown that an increase in alkalinity makes the vitreous swell. Although an alkaline condition may not be precipitated by emotional and physical trauma, perhaps an acid condition is. Years ago[11] it was proved that acid solutions cause a turgescence of the sclera decreasing the space for the intraocular contents.

It was interesting to find that Priestly Smith, in 1888, found that an increase of even one mm. of mercury pressure in the vitreous chamber led to almost complete obliteration of the anterior chamber.

Searching for a possible trigger mechanism in shock glaucoma, it was noted[12] that it is not necessary to open the anterior chamber of an eye in order to cause the formation of plasmoid aqueous. Apparently external trauma may also cause it. With the formation of plasmoid aqueous, there would be an increase in proteins, sugar, and urea, specific gravity and viscosity. Such a train of events could inhibit drainage through the trabecular-Schlemm canal system and intraocular pressure could be increased thereby.

Grant[13] recently showed that the facility of outflow of aqueous is not affected by age alone. It is affected by raising the intraocular pressure in the narrow-angle type of glaucoma in which the higher the intraocular pressure, the lower the facility of outflow of aqueous. A vicious circle could thus be initiated by a bodily injury of any kind but especially by one that resulted in a severe jar which might cause the lens to move forward, narrowing the angle.

Barkan[7] states, ". . . only a minute fraction of a millimeter of configuration of an already narrowed angle is sufficient to make a critical difference in closure of the angle and in producing increased pressure." In this same article he also says, "In a nervously disposed individual, closure of a minute degree may cause congestion, whereas it would not do so in an individual who was not so disposed." He does not, however, say what happens in individuals who are not nervously disposed and yet who suffer attacks of acute glaucoma.

Whether or not the term "shock glaucoma" should include those attacks ushered in by emotional upsets, as well as those caused by distant physical trauma, or both, or, indeed, whether such a separate designation is warranted at all, remains for future studies to reveal.

It is my own opinion that the cataractous swelling of the lens in these cases is the key to explain the sudden onset of glaucoma. I believe the incipiently intumescent lens is moved forward just far enough, either by jarring or by an increase in vitreous pressure from other and unknown causes, to produce a fraction of a millimeter decrease in an already narrow angle, thus precipitating the acute glaucoma.

We should strive to take better histories and, if possible, especially in state institutions, to obtain a psychiatric evaluation of all patients with acute glaucoma. We should obtain intraocular pressure readings in all injury cases when the patient is past 60 years of age; at the same time, a control series should be run on noninjured persons of the same age group. Where ophthalmologists are employed in institutions for the aged, the anterior chamber depth should be recorded during every eye examination; also the tension. After injuries a comparison could then be made. To make such a study more complete, facility of outflow should also be measured. A quick, simple method should

be devised for measuring the anterior-chamber depth. Absolutely essential, I believe is the examination of the lens periphery in these cases to determine whether or not incipient cataracts are present. To do this, the pupil must be dilated.

So far as treatment is concerned, the best operation today seems to be basal iridectomy or an iridotomy as described by Chandler.[14] In the future, perhaps, an incipient cataract will be removed in all cases in which there is a narrow angle. In suspected cases of glaucoma, especially those in which the intraocular pressure hovers about 25, 26, or 27 mm. Hg., I try pilocarpine first and then neosynephrine. If either brings down the pressure as much as 5.0 mm. Hg in one-half hour I advise those drops in the eyes once or twice a week at bedtime.

Where a diagnosis of glaucoma already has been made in one eye, especially in one with a shallow chamber, Diamox probably should be given temporarily to prevent an attack in the opposite eye in cases of physical trauma, surgical procedures, and severe emotional shock.

1765 Sherman Street (3).

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THE EFFECT OF THE CORRECTION OF REFRACTIVE ERRORS ON NONPARALYTIC ESOTROPIA*

EUGENE R. FOLK, M.D., AND MERRITT C. WHELCHEL, M.D.
Chicago, Illinois

Since Donders, in 1863, presented his concept of the causal relationship between hyperopia and esotropia, ophthalmologists have recognized the value of the correction of refractive errors in estropia. However, there is some uncertainty about the degree of success to be expected from wearing glasses[1-7] and the factors which influence the prognosis. To obtain more specific information, a statistical survey was made of cases of comitant esotropia treated by the correction of refractive errors.

One thousand cases of strabismus from the motility clinics of the University of Illinois Research and Educational Hospitals and the Illinois Eye and Ear Infirmary were reviewed. All of the patients had been examined during 1952 and 1953, although many had been seen prior to this.

Cases with exotropia, definite paralytic

* From the Department of Ophthalmology, University of Illinois College of Medicine. Presented at the May, 1954, meeting of the Chicago Ophthalmological Society.

components, ocular pathology, or inadequate information were eliminated. Children with moderate overaction of the inferior obliques and slight limitation of abduction were included. This left a group of 351 cases of essentially comitant esotropia which forms the basis of this study.

No attempt has been made to classify these cases a priori into accommodative, partially accommodative, and nonaccommodative types, but rather to correlate the various characteristics of these nonparalytic esotropes with the effect of the correction of the refractive error on the angle of squint.

Except for occlusion, no other treatment, such as orthoptics or surgery, was given in these cases during the period of observation used in this study. The term, "successful treatment," indicates that the eyes became straight both for distance and near after wearing glasses, and this occurred in 28 percent of the cases. In nine percent additional cases, there was at least a 50-percent reduction in the angle of squint; the remaining showed little change after wearing glasses.

Age of onset. The onset of the esotropia varied from birth to 10 years, more than 80 percent beginning before the age of four years. In general, more successful results were obtained in those with a later onset of esotropia (table 1). The best results were obtained in those children who developed their deviation between the ages two and one-half to five and one-half years, although

TABLE 1

RELATION OF AGE OF ONSET OF ESOTROPIA TO SUCCESSFUL TREATMENT WITH GLASSES

Age of Onset (yr.)	No. Cases	Percent Successful Treatment
0–½	77	14
½–1½	59	27
1½–2½	82	24
2½–3½	48	37
3½–4½	31	38
4½–5½	17	46
Over 5½	12	12

TABLE 2

RELATION OF DURATION OF ESOTROPIA TO SUCCESSFUL TREATMENT WITH GLASSES

Duration	No. Cases	Percent Successful Treatment
1– 2 mo.	20	70
3– 5 mo.	18	60
6–11 mo.	25	44
1– 2 yr.	53	30
2– 3 yr.	47	18
3– 4 yr.	40	15
4– 6 yr.	52	20
over 6 yr.	54	2

successes were found in all age groups. Most surprising is the fact that some children with an onset of squint earlier than six months of age and in whom an accommodative etiology would be presumed to be slight were successfully treated with glasses.

Duration of the esotropia. The duration of esotropia prior to treatment with glasses was a strong factor in the prognosis, the best results being obtained in those children with a shorter duration of squint (table 2). Only one child who had a squint for more than six years was successfully treated with glasses.

Intermittency. The last factor considered in the history was whether the squint was intermittent or constant. A child whose eyes were straight any part of the day was considered to be intermittent, and a significantly higher percentage of these children responded well to glasses (table 3).

Monocular vs. alternating esotropia. In very young children, when visual acuity could not be determined, ability to hold fixation with either eye when the opposite eye was uncovered was considered an indication

TABLE 3

EFFECT OF GLASSES IN INTERMITTENT AND CONSTANT ESOTROPIA

Type of Esotropia	No. Cases	Percent Successful Treatment
Intermittent	75	69
Constant	270	17

TABLE 4

EFFECT OF GLASSES IN MONOCULAR AND ALTERNATING ESOTROPIA

Type of Esotropia	No. Cases	Percent Successful Treatment
Monocular	212	35
Alternating	137	16

of an alternating esotropia, although there might have been a preference for fixation with one eye. If the difference in corrected vision between the two eyes was greater than one line on the Snellen chart, the child was considered to have primarily a monocular squint. Subsequent treatment in these cases included occlusion as well as glasses. A comparison of the two groups showed that monocular esotropes were more successfully treated with glasses in a ratio of over 2:1 (table 4).

Angle of deviation. In cases in which the alternate prism-cover measurement did not approximate the angle of squint estimated by the Hirschberg method, the former measurement was taken as being the more accurate. Surprisingly enough, when a disparity in the two figures was present, the Hirschberg estimation was usually higher. Most of the squints which responded well to glasses were found to be under 20 degrees (table 5).

Deviation for distance vs. near. A comparison of the relative deviation for distance and near showed as expected that the bulk of the cases in this series had a greater deviation for near. The results of treatment with glasses were essentially the same in these different groups (table 6), the six cases in the third group being without statistical significance.

TABLE 5

RELATION OF ANGLE OF DEVIATION TO RESULTS OF TREATMENT WITH GLASSES

Angle of Deviation	No. Cases	Percent Successful Treatment
Distance:		
1–4°	20	75
5–19°	174	36
20° and over	141	13
Near:		
1–4°	11	60
5–19°	150	47
20° and over	178	10

TABLE 6

RELATIVE DEVIATION FOR DISTANCE AND NEAR VS. SUCCESSFUL TREATMENT WITH GLASSES

Relative Deviation of Esotropia	No. Cases	Percent Successful Treatment
Near > Distance	323	26
Near = Distance	32	27
Near < Distance	6	50

Effect of atropine cycloplegia. All children were refracted under one-percent atropine cycloplegia, the parents being instructed to instil the drops three times a day for three days preceding the refraction. The data in Table 7 indicates that, if the eyes become straight for distance and near under atropine cycloplegia, the prognosis is excellent for a cure by wearing glasses. However, an esotropia remaining after atropine cycloplegia does not rule out the possibility of a cure by glasses.

Refractive error. The relation of the degree of refractive error to the prognosis was determined. When astigmatism was present, the spheric equivalent was determined and this value added to that of the sphere. Few patients were given glasses if the hyperopia was less than one diopter. As the refractive error became greater, the effect of wearing

TABLE 7

RELATION OF POSITION OF EYES ON ATROPINE CYCLOPLEGIA TO SUCCESSFUL TREATMENT WITH GLASSES

Position of Eyes for Distance and Near at Time of Cycloplegic Refraction	No. Cases	Percent Successfully Treated by Glasses
Straight without correction	24	96
Straight with correction	2	100
Remaining esotropia	109	15

TABLE 8

RELATION OF REFRACTIVE ERROR TO EFFECT OF WEARING GLASSES

Diopters of Hyperopia including Spherical Equivalent of Astigmatism	No. Cases	Percent Successfully Treated by Glasses
1.00–1.75	76	14
2.00–2.75	56	18
3.00–3.75	71	21
4.00–4.75	56	32
5.00–5.75	39	56
6.00 and over	33	60

glasses became more pronounced (table 8).

Anisometropia. In our series the presence of anisometropia did not adversely affect treatment with glasses. About the same percentage of successful cases was found in the group with less than three quarters of a diopter of anisometropia in sphere and cylinder as in the group with more than this amount of anisometropia (table 9). One case in which there was four diopters difference in the sphere, and one case in which there was four diopters difference in the cylinder were straightened with glasses.

Myopia. Of the 351 cases, only 12 were myopic. Of these, two were straightened with the myopic correction, and in one other the deviation was reduced by 50 percent.

Undercorrection. In all cases an attempt was made to determine and prescribe the full correction for hyperopia and astigmatism. Despite this, subsequent refractions revealed undercorrection in many cases. Usually the undercorrection was about one quarter of a diopter but several cases were seen where the undercorrection was as high as three diopters. In some of the refractions repeated within several months which showed an apparent increase in the hyperopia, it is likely that the entire amount was not discovered at the previous refraction. However, in other cases, the hyperopia might well have increased in amount as shown by Brown.[8] Some difficulty was also noted in determining correct cylinder axis, particularly in monocular cases. Five cases undercorrected by more than 2.0D. were operated on and later developed exotropias. The additional of as little as 0.75D. to a previous undercorrection was noted to straighten some eyes.

TABLE 9

RELATION OF ANISOMETROPIA TO PROGNOSIS WITH GLASSES

Anisometropia of Either Sphere or Cylinder (diopters)	No. Cases	Percent Successfully Treated by Glasses
0.75 or less	283	22
More than 0.75	68	26

Time of maximal effect of glasses. After the refraction, children were not seen again until they had been wearing their glasses for at least one month. At this time, the majority of those who would eventually benefit from glasses would show some beginning improvement.

By the end of two months, the full effect of the glasses could be determined in 92 percent of the 327 cases. Eighteen of the remaining cases were amblyopic, and the final effect could not be evaluated until the vision became almost equal in the two eyes. Eight other cases had a hyperopia of over five diopters, and it required a longer time to obtain the full effect of their glasses.

One case had less than five diopters of hyperopia and was not amblyopic but six months were required before the eyes were straightened by glasses although they were straight at the time of the atropine refraction.

Bifocals. In 35 cases, usually but not always those with a much greater esotropia for near, a 2.5D. to 3.0D. add was ordered in bifocals. Of these, 13 showed little or no reduction in the esotropia for near. In 15 the near was reduced but not corrected. In seven the near esotropia was corrected. Six of the seven were straight for distance with the distance correction, while one child maintained his esotropia for distance even though straight for near with the bifocal.

Near-point of convergence. In only five

cases was a recession of the near-point of convergence noted. In two of these cases, subsequent observers did not confirm the findings. In two others the near-point was believed to have receded three cm. while wearing the full hyperopic correction. In only one case did the near-point of convergence become remote. It is interesting to note that, in the three cases which developed exodeviations while wearing glasses, the near-point was not affected.

Recurrences of esotropia. During the period of observation about 13, or 10 percent, of the patients who were successfully treated with glasses later developed an esotropia, again in a period ranging from six months to five years. Five had maintained a marked esophoria even though straight with glasses. Four cases were undercorrected at the initial refraction, and their deviation was corrected when the full hyperopic correction was ordered. One child developed a severe septicemia with metastatic abscess formation and her esotropia recurred. In two cases, amblyopia and esotropia recurred because of failure to maintain proper partial occlusion. The last patient to show relapse was a progressive myope whose eyes were straightened by prescribing the full myopic correction.

Discontinuation of glasses. In 20 percent of 70 cases in which the eyes had been straightened with glasses and in which good follow-up data were available, it was possible to maintain single binocular vision without glasses and with comfort. There was no relation to refractive error, intermittency, angle of deviation, age of onset of deviation, or duration of deviation.

Conclusions

In a statistical survey of 351 cases of comitant esotropia, 28 percent obtained straight eyes both for distance and near by wearing the full correction of the refractive error and occlusion if necessary for any amblyopia.

The factors favoring successful treatment with glasses included an onset of the esotropia after the age of six months, a short duration of squint before treatment was started, intermittency, monocularity, a deviation measuring less than 20 degrees, and more than four diopters of hyperopia. Anisometropia and the relative deviation for distance and near did not influence the prognosis. Esotropia which was fully corrected by atropine cycloplegia had an excellent prognosis on wearing glasses, but it is noteworthy that other cases not straightened by cycloplegia were still cured by wearing the proper correction.

It should be emphasized that any of the previously mentioned unfavorable factors did not exclude the possibility of improvement by correction of the refractive error.

On the basis of only a few cases, it seems that myopes with esotropia could be straightened with the myopic correction, and bifocals could reduce or correct an esotropia for near. When amblyopia was eliminated and if the correction was less than five diopters, the full effect of wearing glasses became evident at the end of two months, providing that the full and accurate correction was prescribed. Recession of the near-point of convergence after wearing a full hyperopic correction or bifocals was not a problem.

904 West Adams Street (7).

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HEMANGIOPERICYTOMA OF THE ORBIT*

SANDERS A. GOODMAN, M.D.
Van Nuys, California

While the diagnosis of an orbital tumor can often be made with relative ease, because of its relatively inaccessible location the exact nature of such a tumor often remains a perplexing problem. Its treatment, in contrast, is relatively simple, extirpation by one means or another being in order. In most instances the precise nature of such a tumor is determined only after it has been removed and examined histologically. It is true that certain tumors occur with greater frequency than others and often a presumptive diagnosis can be made before surgery. Such a diagnosis is often aided by a general physical examination, including laboratory and X-ray studies. The final diagnosis, however, must remain with the pathologist.

Vascular tumors constitute one of the most common types of all orbital tumors. Hemangiomas are formed by all the elements that go to make up the embryonic vascular bed, the type of tumor depending upon which element predominates. Reese[1] terms this the polymorphous group. In general they are benign and include the various types of hemangiomas, cirsoid arterial aneurysms, hemangiomatosis of the retina and cerebellum, and so forth.

Other tumors which arise from some specific element of a blood vessel Reese terms the monomorphous group. This group includes the hemangioendothelioma, arising from the endothelial cell; the hemangiopericytoma, arising from the pericyte; and the leiomyoma, arising from the smooth muscle cell.

The following case report is that of a hemangiopericytoma arising in the orbit. A review of the literature reveals no previous report of such a tumor primary in the orbit.

* From the Department of Ophthalmology, Mount Sinai Hospital and Clinic, Los Angeles, California.

CASE REPORT

On January 12, 1951, R. A., a 30-year-old white man, came to the eye clinic of the Mount Sinai Hospital and Clinic with a marked proptosis of his right eye. This, he stated, was of sudden onset four years previously, rapidly reached its present proportions, and had remained in this condition ever since, decreasing slightly with rest and relaxation and on reclining.

Vision in this (right) eye was blurred and was not helped with glasses. There was no pain or diplopia and no history of trauma or infection.

As a child he had chickenpox, measles, mumps, pertussis, diphtheria, and recurrent attacks of acute tonsillitis. In 1945 he had a kidney stone which was successfully removed without surgery. The rest of his history was irrelevant except possibly for an indefinite history of allergy to strawberries.

On January 29, 1947, four years prior to coming to the Mount Sinai Clinic, he had consulted another Los Angeles ophthalmologist for this same condition. Examination at this time revealed a visual acuity in the right eye of 20/40—1, correctible to 20/30—1, and in the left eye of 20/15. Exophthalmometer readings were: O.D. 22 mm.; O.S. 16 mm. Fundus examination was negative except for slight perimacular edema, retinal striae, and venous stasis. Visual fields were normal. Slight diplopia was present in upward gaze. There was no pathologic condition of the sinus and skull X-ray studies were negative. The diagnosis at this time was probable angioma of the orbit.

Examination on January 12, 1951, revealed a very marked proptosis of the right eye. Exophthalmometer readings (Luedde) were: O.D., 34 mm.; O.S., 21 mm. (fig. 1). There was marked dilatation of the episcleral vessels, especially temporally where they were large and distended. The cornea, anterior chamber, iris, pupil, lens, and vitreous were entirely normal.

The fundus of the right eye was seen clearly with a +3.0D. lens in the ophthalmoscope while that of the left eye was best seen with a —1.0D. lens. The retinal vessels were tortuous and distended and an area of elevation was noted below the disc.

Both eyes could fixate a light simultaneously in the primary position despite the fact that the entire right eye was displaced downward and that there was weakness of the lateral rectus and both elevators of this eye.

Vision (uncorrected) was: O.D., 15/200; O.S. 20/20. Vision in the right eye was not improved with glasses. The visual field of the right eye was markedly constricted, whereas that of the left eye was normal.

Above and temporal to the right eye was felt a soft tissue mass which completely filled the area

Fig. 1 (Goodman). There is a marked proptosis of the right eye with exophthalmometer readings of 34 mm., as compared with 21 mm. in the left eye. The distended episcleral vessels are easily seen.

between the eye and the orbital walls; despite this, the eye could easily be displaced backward into the orbit. The superior oblique tendon was felt as a tense band. No murmur was heard with the stethescope. His left eye was entirely normal as was a general physical examination.

A urinalysis revealed slight albumin, 1-2 hyaline casts, 2-4 pus cells, 4-6 red blood cells. A blood count revealed 102 percent hemoglobin; 5,060,000 RBC; 9,050 WBC, with a normal differential. Wassermann and Kahn tests were negative, an electrocardiogram was normal, and his blood iodine was 5.3 μg.

X-ray studies on January 16, 1951, revealed increased density of the right orbital cavity as compared with the left, compatible with the presence of a retrobulbar tumor. Erosion of the superior lateral wall of the right optic foramen was suspected. Changes compatible with chronic sinusitis of the left frontal and maxillary sinuses were found (fig. 2).

On February 23, 1951, under sodium-pentothal anesthesia, an attempt was made to remove the tumor through a supraorbital incision through the brow. While the tumor could be felt with the finger, it was impossible to remove it as it completely filled the orbit. Consequently, the eye was enucleated and the tumor then removed.

It was noted that the tumor surrounded the optic nerve, filled the posterior orbit, and extended into the optic foramen. It was very friable, bled easily and profusely, and had to be removed in a piecemeal manner. Due to uncontrollable hemorrhage complete removal was impossible. Gelfoam was placed in the orbit, the lids were sutured together, and a pressure bandage applied.

One week later, on March 2, 1951, the entire orbit was exenterated using forceps and cautery. Again extensive bleeding was encountered rendering accurate observation difficult. It was felt that the tumor had definitely penetrated the orbital dura and dehiscences were noted along the walls of the orbit. At the completion of surgery all tumor had been removed down to the bare bone. The lids were preserved.

Postoperatively the course was uneventful. There was a moderate secondary anemia for which three blood transfusions were given. On March 8, 1951, X-ray therapy was started to the right orbit every two days, using frontal and lateral approaches.

On March 17, 1951, he was discharged from the hospital and followed in the out-patient department. The orbit had developed a purulent discharge for which antibiotics were given and saline and Zephiran irrigations used. Radiation erythema was present over both portals but this soon subsided. However, a 5.0 by 6.0-mm. ulceration had developed on the right lower lid near the outer canthus. This soon perforated the lid and the entire area sloughed out. This was considered to be due to radiation necrosis (fig. 3). During his course of treatment he received a total of 2,200 r over the frontal approach and 1,700 r over the lateral.

During the following months he was followed in the clinic for dressings and irrigation of the orbit. Slowly, as granulation tissue filled the orbit, the discharge subsided. In view of the great resemblance of this granulation tissue to that of the tumor, a biopsy was done but no tumor tissue was found. Repeat general and neurologic examinations, blood counts, and chest X-ray studies were done at intervals but failed to show any metastasis or other pathologic process.

A skull X-ray film on April 4, 1951, revealed considerable absence of the posterior bony wall of the right orbit and apparent destruction of bone along the lateral inferior quadrant of the right orbit extending into the right zygoma. Only the lesser wing of the sphenoid on the right remained intact while the greater wing and lateral inferior portion of the orbit behind the infraorbital ridge seemed either removed or destroyed. The impression of the tumor board was that no further surgery be done since the X-ray findings could be explained on an inflammatory basis, conceivably due to radiation therapy.

Due to the extensive radiation the patient had received, no plastic repair of the lower lid was thought desirable. The patient had, by this time, been wearing a patch for over a year. He became impatient and saw another doctor who, on September 28, 1952, reconstructed the orbit with a split-thickness graft from the abdomen.

The graft took well but soon discrete holes developed in the upper lid; these soon merged into one large hole at which point no further progress occurred. A similar hole developed in the lower lid which began to disintegrate as had the upper. A hole also appeared in the floor of the orbit. This disintegration was unassociated with trauma or inflammation.

A few months later a plastic procedure to reconstruct the lower lid was attempted by undermining and advancing adajcent skin. For a short period of time this also was successful but again the tissue slowly disintegrated. A complete pros-

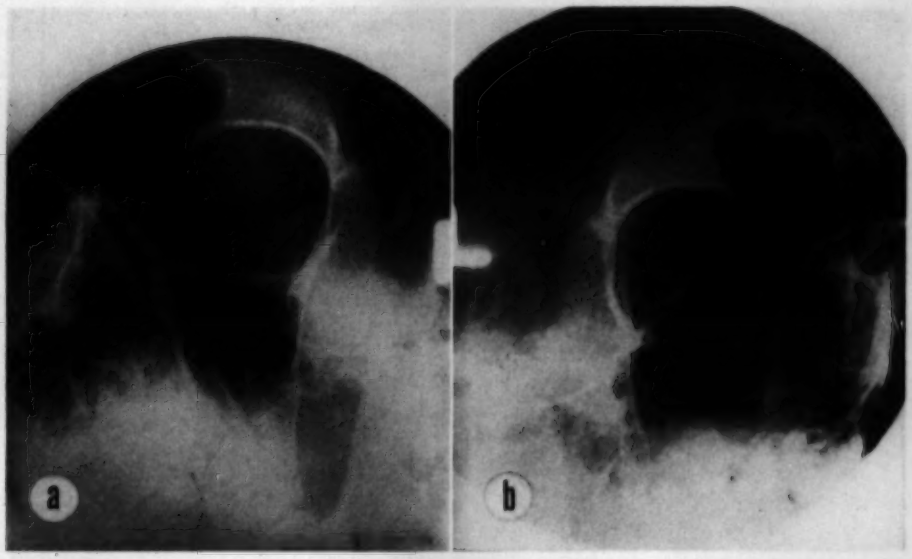

Fig. 2 (Goodman). X-ray films of the orbits (January 16, 1951). There is definite clouding of the right (a) orbital cavity as compared with the left (b). The right optic foramen shows a loss of integrity of the wall at the superolateral margin.

thesis was not attempted and the patient, when last seen, was still wearing a patch.

As of six months ago, at which time the patient was last seen, there were no metastases or local recurrences.

Pathology reports

The following is a quotation from the report submitted by Dr. A. Ray Irvine, Jr., pathologist at the Estelle Doheny Eye Foundation Laboratory:

The specimen consists of sections through a retrobulbar tumor. It is stained with hematoxylin-eosin and seems to be a very cellular tumor composed of cells that range from oval to somewhat spindle-shaped, and have distinctly staining chromatin material, multiple or single nucleoli. Some cells have vacuoles within their nuclei.

Fig. 3 (Goodman). The outer one half of the right lower lid has sloughed, presumably due to radiation necrosis.

Of primary interest is the presence of many spaces of the caliber of capillaries; many of these are ill formed and not all are lined by endothelium. In places they seem to be lined by tumor cells. Blood is not seen within these spaces except in some instances where they obviously represent nutrient blood vessels.

Silver stains indicate that the proliferating tumor cells are not within the lumen of capillary or potential capillary spaces, indicating therefore that the tumor cell does not arise from proliferating endothelium. There is, however, a large amount of silver-staining reticulum developed throughout the tumor that divides the tumor cells into small groups. This connective tissue stroma is more easily seen in the Held stain and in the Mallory phosphotungstic acid stain.

There is no evidence of pathology in the eye.

Opinion. Possible hemangiopericytoma. Possible angioblastic form of meningioma (figs. 4, 5, and 6).

Comment. This tumor is very suggestive of the hemangiopericytoma described by Arthur Purdy Stout. However, because of its retrobulbar location it would be difficult to differentiate from some forms of rather vascular cellular meningioma. These cells are somewhat large to be of the latter and I favor a diagnosis of hemangiopericytoma.

Sections were sent to Dr. Arthur Purdy

Fig. 4 (Goodman). Hemangiopericytoma of the orbit. The large number of capillaries is not easily apparent because most of them are collapsed. No lumen can be seen. (Hematoxylin-eosin, ×165.) (P & S.)

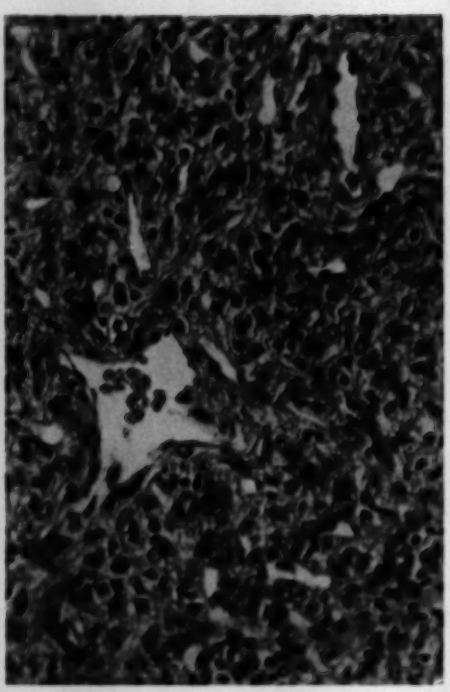

Fig. 5 (Goodman). Hemagiopericytoma of the orbit. This section shows in detail the relation of the pericytes to the capillaries. The small rod-shaped black nuclei of endothelial cells mark the presence of collapsed capillaries and show the close relationship of the tumor pericytes to them. (Hematoxylin-eosin, × 330.) (P & S.)

Stout whose opinion was as follows:

Trichome and Laidlaw silver reticulin impregnations show that this is a vascular tumor in which most of the vessels have only potential spaces instead of lumens. The vessels are lined by normal endothelial cells, outside of which are packed masses of rounded and oat-shaped cells which I believe are pericytes. I believe therefore this is a hemangiopericytoma.

Comment

Before entering into a discussion of this type of tumor it was thought advisable to review briefly the basic anatomy of blood vessels.

The characteristic structure of every blood vessel and the only component of the wall of the capillary is the endothelium. This is composed of separate endothelial cells around which is a network of reticular fibers; this network forms a thin membranous sheath around the capillaries and separates them from the elements of other tissues.

Connective tissue also accompanies the capillaries and contains several types of cells among which are the pericytes. These are cells with long, branching processes which surround the capillary wall, are contractile, and are considered to be of the nature of smooth muscle cells although lacking myofibrils. Since capillaries lack smooth muscle in their walls these cells serve to change the caliber of the lumen. This basic capillary unit is present in all tissue in which blood vessels are present.[3]

The reticulin sheath with its endothelial lining is a basic part of all vascular tumors whether they be benign or malignant. To this may be added other cellular structures as an integral part of the tumor—smooth muscle, pericytes, fat, nerve, bone, and so forth—as well as a fibrous framework of varying amount.

Angiomas in general are not considered true neoplasms in that they have the potential of attaining a certain size only, then remain stationary or regress. They are benign in that there is no continuous growth and no tendency to invade or metastasize. On the other hand, those tumors that arise from some specific element of a blood vessel—hemangiopericytomas, hemangioendotheliomas, and leiomyosarcomas—have a tendency to invade or metastasize and are potentially malignant.

In 1942, Murray and Stout[3] published a report of nine tumors in which the characteristic cell found was the pericyte and for which they suggested the name hemangiopericytoma. By means of tissue culture, Murray was able to demonstrate that these cells corresponded morphologically and physiologically with the epithelioid cells of the glomus tumor.

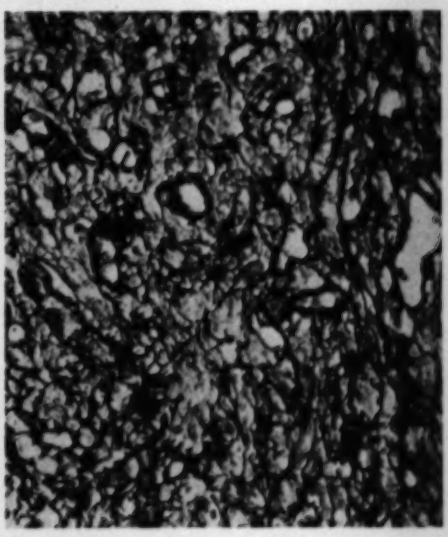

Fig. 6 (Goodman). Hemangiopericytoma of the orbit. The many capillaries are more easily seen because the reticulin sheaths mark them clearly. The stain also shows that, as usual, almost all of the pericytes are surrounded by delicate blackened reticulin fibers. (Laidlaw silver reticulin stain, ×330.) (P & S.)

Histologically these tumors were composed of capillaries surrounded by pericytes. The capillaries were simple endothelial-lined tubes surrounded by a connective tissue reticulin sheath around which were grouped the pericytes. These varied in appearance from small to large and from spindle-shaped to rounded. Between the individual cells were connective tissue fibers in varying amounts. Occasionally the vessels with their surrounding tumor cells were separated from each other by a fibrous stroma, but more often they were so closely packed that the cells surrounding one vessel merged with those of adjoining vessels.

The distinguishing feature of a hemangiopericytoma is the location of the cells outside the capillary wall. In direct contradistinction is the hemangioendothelioma in which the tumor cells lie within the capillary lumen. Such a distinction may be difficult to determine by ordinary stains but can be conclusively demonstrated by Laidlaw's silver reticulin stain. This stain shows in great detail the reticular sheath of the capillary and thus the location of the tumor cells may be easily determined.

Brief mention may be made of the glomus tumor, a normal structure found in the skin of the extremities and nail matrix of the digits. Each unit of this tumor consists of an arteriovenous anastomosis with smooth muscle fibers, nerve fibers, and epithelioid cells all of which is surrounded by coarse collagenous tissue. The epithelioid cells of this tumor are similar to the pericytes in hemangiopericytomas but have a different arrangement, being cellular in the former and continuous throughout in the latter.[4]

In a subsequent report Stout presented 25 additional tumors.[5] The majority occurred

in the subcutaneous or muscular tissues but cases were also found in the retroperitoneum, mesentery, omentum, tongue, pericardium, diaphragm, ileum, meninges, and ethmoid sinus, the latter invading the orbit secondarily.

Subsequent reports by other authors have appeared in the literature showing involvement of the extrarectal tissues,[6] thigh,[7-9] sigmoid colon,[10] liver,[11] axilla[12] pelvis, [12,13] and hand.[14] In addition Stout mentions two cases in the orbit and one possible case in the optic disc.[15] One of the orbital cases originated in the ethmoid sinus and secondarily invaded the orbit.[5]

This report of the present case is believed to be the first of a hemangiopericytoma originating in the orbit. It is the 45th report of this type of tumor but undoubtedly as its nature becomes better known many more cases will be identified and reported.

It should be mentioned at this point that tumors consisting of a proliferation of pericytes only have been reported prior to the present reports. Reese[1] quotes Schieck who, in 1912, reported a tumor of the disc which consisted of a proliferation of pericytes only and which he termed a perithelioma. Reese says that this would be classified as a hemangiopericytoma. In a more recent report, Nover, in 1953, reported two cases[16] of orbital perithelioma. The cells were tall cylindrical cells which formed thick mantles around the blood vessels and whose origin from the perithelium of orbital vessels was highly probable.

These tumors apparently can occur wherever capillaries exist, that is, in practically all tissues. Grossly there is little to identify them. They generally occur as a firm encapsulated mass. They are slow growing and many follow a benign course; there are, however, significant instances of local recurrence following removal, of invasion and destruction of adjacent structures, and of distant metastases. The present case has been known to exist for seven years; there is no evidence of metastasis although there was marked destruction of adjacent tissues.

Mention was made earlier of the great difficulty in establishing a preoperative diagnosis. This was certainly true in the present case. Certain features of this case, however, presented clues as to its nature prior to surgery. The easy compressibility of the eye into the orbit and the history of variations in the degree of proptosis, depending upon rest and position, led us to suspect a vascular tumor.

Removal of the tumor necessitated exenteration of the orbit but it appears that it was completely removed despite its invasion of adjacent bone. Seven years have now elapsed since the tumor first made its clinical appearance. There has been no local recurrence following its removal and no additional invasions of adjacent structures or metastases have been detected. It is impossible to evaluate fully the effects of X-ray therapy on the apparent cure in this case. The patient did have extensive postoperative X-ray therapy; this undoubtedly adversely affected the lid tissues and subsequent plastic surgery.

Summary

1. The report of a hemangiopericytoma originating within the orbit is presented. It is believed to be the first report in the literature of such a tumor primary within the orbit.

2. The nature of these tumors, both clinical and pathologic, is discussed.

3. A review of the literature on hemangiopericytoma is presented in which the different sites of involvement are listed.

4849 Van Nuys Boulevard

I am indebted to Dr. A. Ray Irvine, Jr., and the Estelle Doheny Eye Foundation Laboratory for the pathologic reports. Particular thanks are due Dr. Arthur Purdy Stout of Columbia University College of Physicians and Surgeons who supplied the photomicrographs and descriptions of the tumor. I am also indebted to Dr. S. V. Abraham and Dr. Peter Soudakoff for their help in preparing this paper.

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SIMPLIFIED SURGICAL TECHNIQUE IN THE TREATMENT OF CHRONIC GLAUCOMA

R. W. B. Holland, F.R.C.S.
Baluchistan, Pakistan
AND
Victor E. Lepisto, M.D.
Hancock, Michigan

Iridencleisis for the relief of tension in chronic glaucoma, which has grown in popularity in recent years, is performed by various methods. The purpose of this communication is to present a simple and rapid method of iris inclusion, which is effective and attended by few complications. This new method was devised and developed in the annual eye clinics in Shikarpur, West Pakistan, and has been carried out on several hundred glaucomatous eyes by the surgeons on our staff. An analysis of 112 consecutive cases operated on in 1953 is appended.

The physiologic basis of the procedure of iridencleisis is not discussed in this paper, since the neurovascular and filtration aspects of the problem have been admirably stated. The efficacy of iris inclusion as a procedure for reducing the tension in chronic glaucoma of both the wide-angle and narrow-angle types is already established, but most of the operations devised previously are relatively complicated and time-consuming.

The method we present, designed to simplify the surgical procedure, is, at the same time, attended by fewer complications.

Description of surgical technique

The tension of both eyes is taken at the patient's first visit to the out-patient department, and is again checked on the operating table before surgery. Tetracaine (Amethocaine) in 0.5-percent solution is used as drops three or four times, and one drop of 10-percent neosynephrine is instilled after

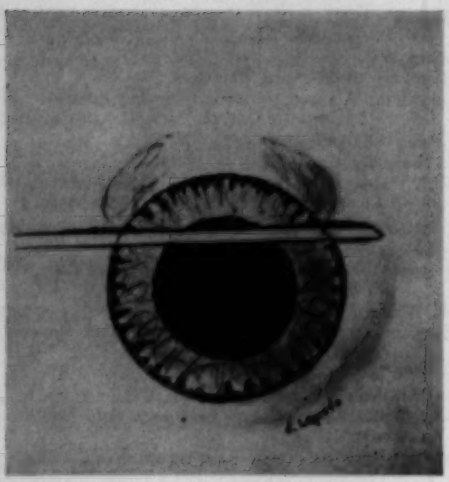

Fig. 1 (Holland and Lepisto). Puncture and counterpuncture with escape of aqueous in subconjunctival tissue.

the first drop of tetracaine to ensure complete hemostasis. Facial-nerve akinesia is produced by the O'Brien or Van Lint methods, and retrobulbar injection of one cc. of local anesthetic solution is used routinely. We use Nupercaine hydrochloride (1/2,000) with adrenalin for all local infiltration and nerve-block anesthesia.

The incision is made with the von Graefe knife. The globe is held below with fixation forceps, and the puncture and counterpuncture with the knife are made at, or just outside, the corneal limbus, beginning at about the 10:30-o'clock position and finishing at the 1:30-o'clock position.

When the tip of the knife penetrates the sclera at the 1:30-o'clock position, some aqueous fluid is allowed to escape into the subconjunctival tissues of the eye (fig. 1). This maneuver is designed to release the pressure of the aqueous slowly, and is aided by slight rotation of the knife.

The incision is then carried upward to the limbus, cutting between the sclerocorneal margin and through it at a point two or three mm. above the limbus until the knife blade lies under the conjunctiva which is then dissected up, with the remainder of the incision forming as broad a conjunctival flap as possible. The knife is then withdrawn leaving the conjunctiva still attached (fig. 2). (A somewhat similar type of incision has been described by Ewing* in cataract extraction.)

Then, with a toothed iris forceps, the iris is drawn out of the lateral side of the wound in the right eye and the medial side of the wound in the left eye—if the operator is right handed. The short leg of the V-shaped protrusion of the iris is cut short with a small pair of sharp-pointed de Wecker's scissors and the long free end of the iris is tucked under the bridge flap of conjunctiva and left there (figs. 3 and 4). The conjunctival flap holds the free end of the iris in place, and no sutures are necessary.

A small quantity of sterile penicillin ophthalmic ointment (25,000 units per gm.) is inserted into the lower fornix and the eye is closed with a pad and bandage. The eye

* Ewing, A. E.: Am. J. Ophth., 11:219, 1928.

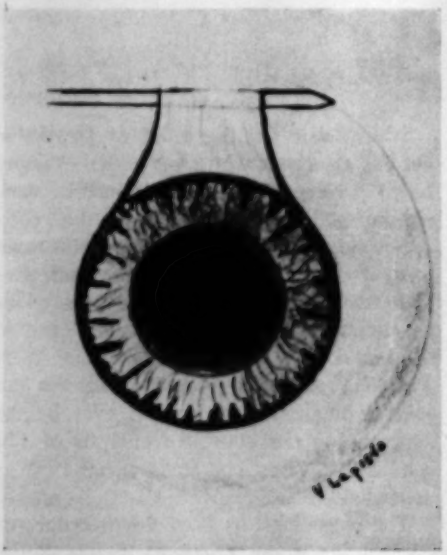

Fig. 2 (Holland and Lepisto). Formation of conjunctival bridge flap. Knife is then withdrawn without cutting the conjunctiva.

is dressed on the following day, when one drop of one-percent atropine solution is instilled. A shade is applied after removal of the bandage on the fifth or sixth day, and the patient is discharged home.

Results

Several hundred glaucomatous eyes have been operated on by this method, both by beginners and by those with years of operating experience. The complete records are not available but for purposes of demonstrating the effectiveness of the operation Tables 1 and 2 are presented. Table 1 shows the tensions of the eyes both before and after operation, just before discharging the patient. The series in Table 1 and that in Table 2 are consecutive series of chronic glaucomatous eyes operated on by the method herein described. Tensions were taken with the McLean tonometer.

One of the problems at the eye clinics in Shikarpur and Khairpur in Sindh, where the patients are illiterate peasants among whom glaucoma is common, was to devise an operation which would be effective, quickly done, result in a minimum of complications, which would not keep the patients in hospital more than a short time, and which would not interfere with a subsequent operation for cataract extraction in the older age groups, should this become necessary. Table 1 gives a fair indication of the effectiveness of the procedure which has been developed.

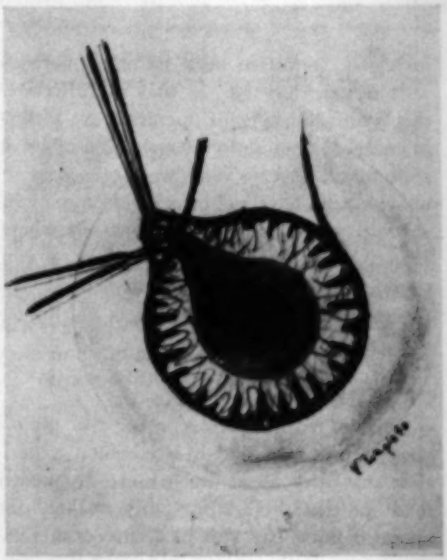

Fig. 3 (Holland and Lepisto). Iris drawn out and pillar cut with de Wecker's scissors.

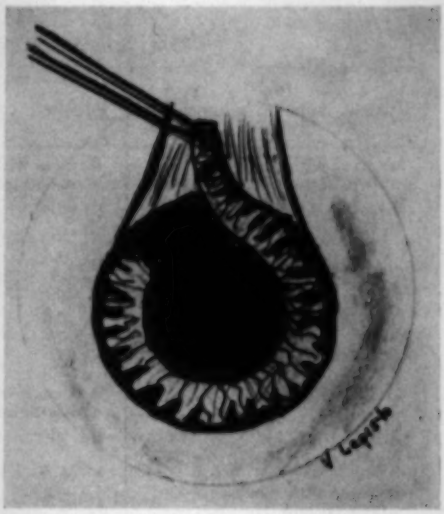

Fig. 4 (Holland and Lepisto). Free end of iris tucked under the bridge flap.

A second and important indication for this operation is a prophylactic one. Because of their economic condition, backwardness, and lack of education, and owing to the great distances and expense involved in coming to hospital, it is impossible to expect the patients to attend for regular examinations, or even for replenishment of their pilocarpine or eserine drops or ointment. For this reason, whenever glaucoma is found in one eye, we try to persuade the patient to have the other eye operated on prophylactically, since, in our experience, the disease invariably makes its appearance in the other eye after an interval of months or years.

We see several hundred cases every year of double absolute glaucoma, and now, year after year, an increasing number of patients

TABLE 1

RESULTS OF OPERATION IN 72 CASES OF GLAUCOMA

Patient	Pre-operative Tension	Post-operative Tension
a. Eyes with tensions of and above 80 mm. Hg (McLean)		
S.	90	32
F. G.	95	30
b. Eyes with tensions of and above 70 mm. Hg (McLean)		
B.	70	20
Z.	70	25
S.	70	15
M.	70	Nil
S.	70	26
T.	70	24
A. B.	70	18
A. D.	75	24
N. M.	70	18
c. Eyes with tensions of and above 60 mm. Hg (McLean)		
M.	65	15
B.	60	18
A. D.	60	20
H.	65	15
J.	60	18
N. M.	65	15
d. Eyes with tensions of and above 50 mm. Hg (McLean)		
U.	50	22
G.	50	22
G.	50	22
P.	54	30
M. P.	50	25
M.	50	18
N.	50	16
N.	52	20
K. M.	55	15
e. Eyes with tensions of and above 40 mm. Hg (McLean)		
B.	40	20
P.	40	Nil
N. B.	40	20
J.	40	20
M. S.	40	20
A. H.	45	20
H.	40	20
M. M.	45	15
M. M.	40	18
W.	40	15
W.	40	15
K. B.	45	22
S.	40	22
S.	40	25
K. B.	40	20
R. M.	40	32
R. M.	40	24
f. Eyes with tensions of and above 35 mm. Hg (McLean)		
M.	35	18
K. M.	35	20
S.	35	30
S.	35	25
R. M.	35	20
D.	35	18
C.	36	24
B.	35	15
I. Z.	35	20
H.	38	Nil
F.	35	16
J. K.	35	25
M. B.	35	25
W.	35	18
A. H.	35	22
M. B.	34	25
G. B.	35	Nil
A. K.	35	20
A. K.	35	20
B. J.	35	25
N. K.	35	22
V. B.	35	35
V. B.	38	20
S. M.	38	20
S. B.	35	10
S.	35	20
H. B.	35	18
H. B.	35	18
K. B.	35	18

come back to us with one eye blind from absolute glaucoma, untreated, but with the operated eye functioning well and usefully, following the procedure of iris inclusion.

Table 2 contains the tensions before and after operation of a consecutive series of 40 eyes operated upon prophylactically.

As may be seen from Table 2, the tensions before and after operation were not altered to any great extent; however, one, two, or three years later we see the benefit obtained. It is very rare in our area for a patient to report to a hospital if he is well, or if his eyesight remains good, and so we see almost exclusively those who are developing or have developed cataractous changes in the lens.

Even in these cases, the tension in the operated eye remains normal and permits a cataract extraction to be done with success. This is in accord with most reports of iris inclusion operations done by other methods.

It is generally agreed that the effects of this infiltration type of operation are lasting, in contradistinction to the operation of broad iridectomy. Every year we see scores of patients who have had broad iridectomies for chronic glaucoma by surgeons elsewhere. These operations have resulted in a constantly raised tension of between 35 and 40 mm. Hg, or even higher.

COMPLICATIONS

A. HYPHEMA

Chronic glaucomatous eyes are notoriously degenerate, and it is common experience that they bleed much more frequently than normal eyes. For this reason the operator must pay special attention to various points in the technique in order to prevent hemorrhage. Adequate vasoconstriction with neosynephrine (Winthrop-Stearns) in

TABLE 2
RESULTS IN PROPHYLACTIC OPERATION IN 40 CASES
(Tensions in mm. Hg (McLean)

Patient	Pre-operative Tension	Post-operative Tension	Patient	Pre-ozerative Tension	Post-operative Tension	Patient	Pre-operative Tension	Post-operative Tension
B.	30	27	M.	30	15	K. M.	22	20
K.	32	20	M.	30	20	J. K.	22	15
K. M.	32	20	N. B.	28	15	A.	30	15
K.	30	25	B. S.	28	Nil	S.	25	18
L.	25	20	A. R.	20	18	S. B.	28	15
M. B.	30	20	C.	20	16	M. B.	28	20
J.	25	15	M. S.	28	20	G. A. H.	25	15
B. B.	28	20	M. S.	22	Nil	S.	30	20
M.	25	15	I.	15	15	A. R.	25	20
J.	32	25	B.	18	20	D. B.	30	20
G.	32	20	I.	20	15	P. D.	30	18
S. K.	22	20	M.	18	16	J. W.	25	15
A. R.	20	20	B.	22	15	H. B.	15	Nil
A. D.	30	15						

10-percent solution, gentle manipulation at operation, a really sharp knife, diligent massage with the curve of a Smith's hook, and irrigation of the anterior chamber if any bleeding should occur from the cut iris at the end of operation—all these are needed for success. If hyphema is found at the dressing next day, then the patient is given a general anesthetic and the hyphema is milked out after re-opening the wound.

If the operator adheres to the technique, this complication occurs only occasionally, and it need never have more than a nuisance value.

B. UNDUE LOWERING OF TENSION POST-OPERATIVELY

In some instances the neurovascular and filtration effect of the operation is so pronounced that no reading at all is obtainable on the tonometer on the sixth or seventh day after operation. The patient complains of pain and dimness of vision. The instillation of atropine drops (one percent at four-hour intervals, together with the application of hot fomentations) soon brings the tension up to normal, and the symptoms disappear.

C. FAILURE TO LOWER THE TENSION TO 30 MM. HG OR BELOW

In the cases in this series there are two instances in which the postoperative tensions were 35 and 32 mm. Hg and recently a case was seen with a postoperative tension of 34 mm. Hg. But these are the only three seen in a series involving several hundreds of eyes, and in these cases the conjunctival bridge was extremely narrow and the piece of iris enclosed must have been extremely small, owing to an error in technique.

D. SEPSIS

We have never met with sepsis or updrawn pupil.

SUMMARY AND CONCLUSIONS

1. A new method for performing the iris inclusion operation is described.

2. It is claimed that its advantages over previous methods are:

a. It is not a complicated procedure and can be done with ease and rapidity.
b. Other than the surgical trauma to the eye, there is less chance of injury to the lens capsule.
c. In cases of chronic glaucoma selected for surgery it is effective in reducing tensions.
d. It is attended with very few complications.
e. The wound heals rapidly without the necessity for sutures.
f. The patient need stay in the hospital for only a week.

Mission Hospital, Quetta.
210 Quincy Street.

NOTES, CASES, INSTRUMENTS

TOPICAL USE OF CORTISONE IN SYMPATHETIC OPHTHALMIA*

FOUR-YEAR OBSERVATION OF A SUCCESSFULLY TREATED CASE

L. L. FORCHHEIMER, M.D.
New York

For hundreds of years, sympathetic ophthalmia has been one of the most serious problems in ophthalmology. The disease was known as far back as 1000 A.D. During all these years many cases of sympathetic ophthalmia have been reported in the medical literature.

Up to five years ago, all attempts with conservative treatment have proven disappointing. Immediate enucleation of the sympathogenic eye was the only recourse if signs of inflammation were noted in the sympathizing eye.

In 1949, the adrenal cortical hormone, cortisone, was added to our armamentarium of drugs. Since that time, only a few cases of sympathetic ophthalmia treated with cortisone have appeared in the literature.

Woods[1] reports a case of sympathetic ophthalmia in which cortisone was used locally. In this case, there was complete clearing of all inflammation but no improvement of vision.

Raiford[2] treated a patient suffering from sympathetic ophthalmia systemically and locally with cortisone and obtained disappearance of all symptoms and clearing of vision. His report was made after he had observed the case for a three-month period.

McLean, et al.,[3] report dramatic response to local application of cortisone in three cases of sympathetic ophthalmia, one of which was a flare-up after six years.

Mosher[4] treated three patients with sympathetic ophthalmia successfully by using cortisone eyedrops; improvement was noted after two, four, and seven days, respectively.

Fitzgerald, et al.,[5] concluded in their evaluation of the clinical results of ACTH and cortisone therapy that "further clinical work is necessary to evaluate the role of these drugs in the therapy of sympathetic ophthalmia."

Haik, et al.,[6] in a review of 72 collected cases of sympathetic ophthalmia, found that "corticotropine and cortisone are capable of controlling the inflammatory and exudative processes in some cases of the disease . . . but relapse may occur if therapy is withdrawn too soon."

Fine, et al.,[7] treated three patients with sympathetic ophthalmia first with systemic cortisone and then with cortisone eyedrops; in all three patients the initial improvement was maintained by cortisone used topically. They conclude that "the posterior segment involvement by sympathetic ophthalmia can be controlled with local use of cortisone, whereas such local therapy has been found ineffective in other forms of chronic posterior uveitis. . . . Sympathetic ophthalmia may require a maintenance dose for many months. . . ."

The different authors here quoted do not agree as to the effectiveness of local versus systemic treatment with cortisone; nor has it been established how long such treatment has to be continued in order to prevent a recurrence of the symptoms of the disease. In order to clarify these and other questions, the following case of sympathetic ophthalmia is described in detail:

REPORT OF A CASE

A. D., a white man, came to the office on October 25, 1949, around noon, and stated that about one hour earlier, while he was tightening bolts with a wrench, some particles of foreign matter flew and struck his right eye.

Examination of patient's right eye showed

* From the Department of Ophthalmology, Beth-Israel Hospital.

that there was a perforating wound of the cornea in the region of 11-o'clock near the limbus. There was a hole of the iris behind the corneal wound in the same region, and there was a rupture of the lens capsule. Further examination showed that there was a small grayish mass visible in the posterior part of the vitreous, in the temporal upper quadrant and immediately in front of the retina. This small mass appeared to be a particle of metal.

The left eye was normal in all respects.

An X-ray examination of the right eye verified the diagnosis of a particle of metal within the eye. It measured approximately two mm. in diameter. On the same evening, the patient was admitted to Beth-Israel Hospital. His past history showed that he had had malaria in 1918, a tonsillectomy in 1931, and an appendectomy in 1944. His general physical examination was normal, with the exception of the eye findings which were as described.

On the following morning, October 26, 1949, a traumatic cataract had developed which, at that time, involved two-thirds of the lens. The particle of steel in the interior of the eye was no longer visible.

Immediate operation to extract the particle of metal was decided upon. The giant-magnet was applied and, on the 10th application, a particle of steel was pulled around the lens into the anterior chamber, and placed over the iris, at about the 10-o'clock position. A keratome incision was made at the 12-o'clock position and a particle of steel measuring 2.0 by 2.0 mm. was delivered.

The postoperative course was uneventful, and the patient was discharged from the hospital on November 4, 1949. On the following day, November 5, 1949, when the patient was seen at the office, it was noted that he showed the beginning of mild uveitis of the right eye. He was immediately given penicillin and foreign-protein injections, and, under this treatment, the uveitis cleared up completely in a few days. Within a week, on December 5, 1949, the patient was able to return to his usual occupation.

He was kept under further observation and, on February 15, 1950, that is, three months after his first attack of uveitis, it was noted that he had a few corneal precipitates in the anterior chamber of the right eye. He was again given foreign-protein injections. On March 4, 1950, the second attack of uveitis had cleared up. During both these attacks of uveitis, the patient's left eye was completely normal.

On May 28, 1950, he was readmitted to Beth-Israel Hospital for removal of the traumatic cataract.

On May 31, 1950, an extracapsular extraction of the right lens was done. During the operation, the hole of the iris which existed as a result of the injury, was enlarged, making it a complete coloboma above. Immediately following the delivery of the lens, a bead of vitreous appeared in the region of the original wound, but receded spontaneously after one minute. The eye was closed with two sutures.

On the first dressing, on June 3, 1950, a small iris prolapse in the region of the 2-o'clock position was noted; it was approximately the size of two pinheads. The anterior chamber was present.

On June 11, 1950, the prolapse of the iris appeared larger and it was decided to perform another operation.

On June 12, 1950, the prolapse of the iris was excised. The corneal wound was closed with sutures, and a conjunctival flap was pulled over the wound. The postoperative course was uneventful, and the patient was discharged from the hospital on June 23, 1950. At that time, the right eye was whitening, and there was no evidence of uveitis present in either eye.

One month later, on July 23, 1950, numerous precipitates of the cornea appeared again in the right eye, and at the same time the left eye showed several precipitates of the cornea. At that time, the diagnosis of sympathetic uveitis of both eyes was made. The patient was seen in consultation by three

ophthalmologists, who all agreed on this clinical diagnosis. Immediate enucleation of the right eye was suggested and considered but it was felt that cortisone treatment should be tried first. On the following day, July 24, 1950, the patient was started on cortisone treatment. Cortisone was used in full strength, as eyedrops in both eyes at hourly intervals during the day, and as much as feasible during the night.

Within a few days, the number of corneal precipitates of both eyes began to diminish, and on August 7, 1950, the left eye had cleared up completely, while the right eye showed still a moderate number of corneal precipitates. On August 15, 1950, the patient was able to resume his usual work. He continued using cortisone eyedrops in full strength at two-hour intervals during the day time. On October 7, 1950, the frequent use of cortisone was discontinued and only one drop of 0.5-percent cortisone was used in each eye twice a day. Two "old" corneal precipitates of the right eye which had never absorbed, finally disappeared in September, 1952.

In September, 1953, the use of cortisone eye drops was discontinued completely. The patient was kept under regular observation until August, 1954. Both eyes were entirely free from symptoms. There were no corneal precipitates present in either eye nor any other signs of ocular inflammation.

The present visual acuity of the right eye is 20/70 plus, with a cataract lens. The loss of vision in this eye is due to a secondary membrane which is present in the pupillary area.

The left eye has vision of 20/20 with the necessary correction for hypermetropia.

Summary

A case of a perforating eye injury due to a particle of steel lodged in the vitreous is presented. The perforating wound involved the iris and resulted in a traumatic cataract.

Three operations were performed:

1. Magnet extraction of the particle of steel by the anterior route.
2. Combined extraction of the traumatic cataract.
3. Removal of an iris prolapse.

A sympathetic uveitis developed, involving both eyes. The patient was treated with cortisone eyedrops intensively for 11 weeks; complete clearing of the bilateral sympathetic uveitis resulted. The use of cortisone eyedrops twice a day was continued as prophylaxis for a period of three years.

Conclusion

This case of bilateral sympathetic ophthalmia treated exclusively with cortisone eyedrops has been observed for a period of four years. During this time there has been no recurrence of the clinical symptoms of sympathetic ophthalmia—neither during the three years, when the patient was kept on a prophylactic dose of one drop of cortisone in each eye twice a day, nor during the one year following complete discontinuation of cortisone medication.

It appears, therefore, that this case of bilateral sympathetic ophthalmia was permanently cured by the exclusive local use of cortisone eyedrops.

145 East 52nd Street (22).

I wish to thank Dr. Ernest Shapiro, Montreal, Canada, who gave valuable help in preparing this paper.

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ADDITIONAL USES FOR THE BINOCULAR INDIRECT OPHTHALMOSCOPE*

ROBERT J. BROCKHURST, M.D.
Boston, Massachusetts

The binocular indirect ophthalmoscope is intended primarily for the study of retinal diseases and for fundus examination during retina detachment surgery.[1,2] However, it has proved to be of value as an operating light in two ophthalmic procedures wherein good illumination is essential.

First, in performing dacryocystorhinostomy by the external approach, many surgeons prefer to suture the nasal mucosa to the lacrimal sac. This usually proves to be a tedious and time-consuming portion of the operation, and often adequate visualization is not obtained due to poor illumination deep in the wound. Second, in performing goniotomy and goniopuncture with an operating contact lens in place, good illumination and visualization of the angle are necessary. With the instrument mounted on his head, the surgeon has both hands free and obtains a binocular stereoscopic view of the operative field with intense illumination which is coaxial with his visual axis.

Fig. 1 (Brockhurst). The instrument with sterile hemostat attached.

The indirect ophthalmoscope, placed in position on the head prior to scrubbing, is suitably adjusted. Then it is tilted up out of the way for the preliminary work. A small sterile hemostat is then attached to the interpupillary adjustment metal strip of the ophthalmoscope (fig. 1). This allows the surgeon to tilt the instrument into position when it is needed. The condensing lens, which is held in one hand when doing ophthalmoscopy, is not used when the instrument is utilized as an operating light in these procedures.

327 Charles Street (14).

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* From the Retina Service, Massachusetts Eye and Ear Infirmary.

A NYLON BRIDLE SUTURE IN CATARACT SURGERY

ALBERT C. ESPOSITO, M.D.
Huntington, West Virginia

The instrumentation and technique of cataract surgery reveals that small improvements gathered together have generally advanced our techniques and instrumentation and made possible the most excellent results in cataract surgery today.

For more than the last 100 cataracts which I have performed, I have been using as the bridle suture a single strand, 4-0 nylon suture. I had been using black silk but found that occasionally after the cataract procedure had been completed and the conjunctival flap had been placed in position, it was difficult to remove the black silk from the bridle suture area. At times, even a gentle attempt to remove the suture resulted in collapse of the air bubble from the anterior chamber.

To alleviate this problem, Ethicon 4-0, nylon monofilament suture* with the three-eighths inch Atrolon cutting needle was chosen. The ease of insertion of this suture with the cutting needle the smoothness of the suture body itself, and the ease with which the suture can be removed after the completion of the cataract procedure make it well adapted for this procedure. In over 100 cataract procedures, there has not been one instance in which the anterior chamber was lost, during the attempt to remove the bridle suture. When using nylon, the suture actually slides out.

1212 First Huntington National Bank Building (1).

MALIGNANT TUMORS OF THE CONJUNCTIVA†

Report of two cases

E. G. Gill, M.D.
AND
R. B. Jones, Jr., M.D.
Roanoke, Virginia

In any discussion of conjunctival tumors, corneal tumors must be included because a high percentage of both conjunctival and corneal tumors arise at or close to the limbus of the eye and involve both of these structures.

In adults, malignant tumors of the conjunctiva occur as frequently as benign tumors. This is most important to the physician in deciding what type of therapy should be used since there is controversy as to what is best for the patient.

Epitheliomas or epidermoid carcinomas are most frequently seen at the limbus but they do occur at the caruncle and in the bulbar and palpebral conjunctiva. The reported cases of epitheliomas are few and the site of origin in almost all cases was either directly or indirectly connected with the limbus. They can be associated with pterygia, corneal ulcers, pinguecula, with pannus or the scars of old injuries. We are of the opinion that these tumors were originally benign lesions, probably papillomas, and in the interval have undergone malignant change.

Epitheliomas usually occur in adults in the fifth, sixth, and seventh decades of life. The site of origin is usually at the limbus but they may occur away from the limbus. In the cases studied, one tumor was located at the limbus and the other was three mm. from the limbus in the bulbar conjunctiva. Growth of these tumors, we have noted, is relatively slow. In both of our cases, the tumor itself was very vascular, resembling a mulberry type of lesion, and was considerably elevated from the conjunctival surface.

Case reports

Case 1

A white man, aged 61 years, was seen in the out-patient department, complaining of a growth on the white part of his eye for the past 17 months. His uncorrected visual acuity was 20/20 in each eye. He stated that his mother had died of cancer. A tentative diagnosis of epithelioma of the bulbar conjunctiva was made and excision of the tumor mass was recommended. The mass was removed with wide excision of the surrounding conjunctiva and the pathologic report was cancer of the conjunctiva (epithelioma), grade II.

The patient has been followed for the past six months in our out-patient department and

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* Ethicon 4-0 nylon, No. B-662.

† From the Department of Ophthalmology, Gill Memorial Eye, Ear, and Throat Hospital.

no recurrence of the tumor has been noted.

Case 2

A white man, aged 83 years, who is afflicted with Parkinson's disease, complained of a growth on his left eye for over one year. Examination revealed visual acuity to be limited to light perception in both eyes. A diffuse, hyperplastic, mulberry-type lesion was seen at the limbal margin of the left eye on the temporal aspect. This growth involved approximately five mm. of the corneal surface. The patient had bilateral senile cataracts which were responsible for the impairment of vision. A biopsy showed the lesion to be epidermoid carcinoma, grade III.

After due consideration, it was decided to enucleate the left eye. The patient has been carefully followed for the past nine months. His condition is good, with no external evidence of recurrence of the tumor.

Summary

Epitheliomas of the eye are slow growing and of a low-grade malignancy, as compared with epitheliomas elsewhere.

In adults, malignant tumors of the conjunctiva occur as frequently as benign tumors. This is most important to the physician who must decide, after careful study of the patient and the existing lesion, what type of therapy is best in each individual case.

711 South Jefferson Street.

REGRESSION OF RUBEOSIS IRIDIS FOLLOWING CYCLODIATHERMY*

Philip P. Ellis, M.D.
Iowa City, Iowa

The exact mechanism of action of cyclodiathermy in lowering intraocular pressure is not completely understood. Whether it acts primarily to destroy the secretory function of the ciliary body by interfering with its vascular supply or whether it serves to stimulate the formation of a new anastomotic group of vessels and thus affect aqueous outflow has not been established.

It has previously been observed that, at the time of surgery, there may be a temporary disappearance of rubeosis iridis when the cyclodiathermy needle is introduced.[1] Presumably this was due to a temporary vasoconstrictor effect.

The following case is reported because it is believed unique in that in a follow-up period of 10 months after cyclodiathermy the rubeosis iridis has not yet returned and because the disappearance of the rubeosis developed several weeks after surgery.

Case report

History. G. L., a 57-year-old white woman, was first seen in the University Eye Clinic on December 3, 1953, with pain, redness, halos in the left eye for one month. She had consulted an out-of-state ophthalmologist who told her she had glaucoma and gave her some drops to use; this medication did not relieve her symptoms.

She had been a known diabetic since 1942, and was fairly well controlled on 25 units of insulin daily. In the past two to three years she had been told that she had high blood pressure. The vision in her right eye became poor several years ago; a diagnosis of an intraocular hemorrhage had been made.

Examination. Vision in the right eye was counting fingers at two feet and in the left eye hand movements only. Tension in the right eye was 14 mm. Hg and in the left eye, 57 mm. Hg (Schiøtz). Externally, on the right, no rubeosis was noted; on the left, advanced rubeosis iridis (fig. 1), corneal edema, and ciliary congestion were observed.

Ophthalmoscopic examination. In the right eye, a large subhyaloid hemorrhage was seen below the macula extending across the entire retina. In addition a few scattered round hemorrhages (microaneurysms) and hard, yellow, waxy exudates were observed. The vessels showed a moderate amount of

* From the Department of Ophthalmology, University of Nebraska, Omaha, Nebraska.

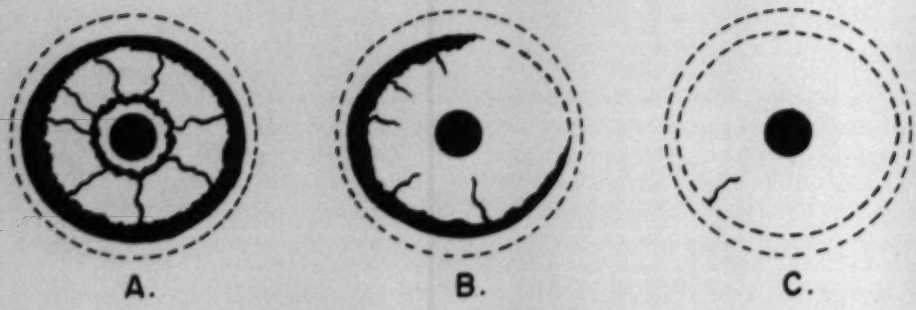

Fig. 1 (Ellis). (A) Initial examination in December, 1953. (B) Three weeks after cyclodiathermy. (C) Seven weeks after cyclodiathermy.

sclerosis. In the left eye, there were occasional microaneurysms and hard yellow exudates. The nerve was slightly pale with some early cupping below.

Hospital course. The patient was started on intensive miotic therapy, and the pressure fell only to 50 mm. Hg. Retrobulbar injection of 1.5 cc. of two-percent procaine with epinephrine lowered the tension to 39 mm. Hg but it rose in about 12 hours to 72 mm. Hg. The patient developed severe nausea and vomiting.

On December 7, 1953, the patient had a cyclodiathermy performed on the left eye in the inferior quadrants. The technique used was as follows: After a conjunctival flap was made from 3- to 9-o'clock positions below, approximately six mm. from the limbus, two rows of partial penetrating 0.5-mm. diathermy punctures were made between the medial and inferior rectus and between the lateral and inferior rectus six and eight mm., respectively, from the limbus. Two 1.5-mm. perforating punctures were placed between the two rows of diathermy on each side. There was some fluid loss and the eye was quite soft at the close of the procedure.

Postoperatively the eye showed only a slight reaction. The cornea stayed clear; the conjunctiva healed well. The pressure was 17 mm. Hg (Schiøtz) on the third day and began to rise a week later until it reached 42 mm. Hg three weeks after surgery.

On December 31, 1953, the patient had cyclodiathermy, performed as described, on the left eye in the superior quadrants. Following this procedure the pressure stabilized at about 18 mm. Hg and remained there for the next three weeks of the hospital stay.

The patient's blood sugars ranged from 150 to 295 mg. percent. The blood pressure was 170/70 mm. Hg. Urinalysis showed one-plus albumin and occasional white cells. The liver function tests were normal. The electrocardiogram was normal, and the P.S.P. test showed 25- to 30-percent dye retention.

Follow-up record. The patient was seen in the clinic on January 20, 1954, and at that time the vision of the right eye was hand movements, and of the left eye 5/200. The tension of the right eye was 14 mm. Hg, and the left, 10 mm. Hg. On slitlamp examination the rubeosis was seen to be regressing (fig. 1). The peripupillary vessels were completely gone and only a few vessels on the outer portion of the iris remained.

On ophthalmoscopic examination the right eye was the same as before hospitalization. The left eye showed fresh hemorrhages in the macular region.

On February 3rd, tension in the right eye was 12 mm. Hg and in the left, 16 mm. Hg. There was further decrease in the amount of rubeosis. The patient began to get some proliferative retinopathy with fibrotic bands radiating from the disc about one to two disc diameters from the optic nerve.

On February 14th, tension in the right eye was 10 mm. Hg and in the left, 15 mm. Hg. The rubeosis had completely disappeared ex-

cept for one small vessel at the 8-o'clock position (fig. 1). The proliferative retinopathy had increased. The patient was referred for posterior X-ray irradiation of the globes. This course of treatment was completed, and the patient was not seen again until May, 1954, at which time her vision was reduced to hand movements in each eye. The appearance of the left iris was the same as on the last visit. Ophthalmoscopically both eyes showed extensive retinitis proliferans. Tension on the right was 17 mm. Hg and on the left, 12 mm. Hg.

The patient was last seen in October, 1954. Her eyes remained unchanged. Tension on the left was down to 10 mm. Hg. Her general health was failing; her diabetes was becoming more resistant to treatment, she showed renal damage and was presumed to have Kimmelstiel-Wilson's disease.

Comment

In view of the positioning of the diathermy points—six and eight mm. from the limbus between the recti muscles—it must be presumed that the anastomotic vessels of the anterior ciliary and the posterior long ciliary arteries were at least partially destroyed. This destruction apparently involved the direct source of the vessels forming the rubeosis iridis.

University Hospitals.

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REMOVABLE GUARD FOR BARD-PARKER KNIFE BLADE*

Robert A. Sills, M.D.
San Diego, California

The use of a guard on a knife blade for controlled depth of incisions is not new. The guard here presented has the advantage of being adapted to the Bard-Parker No. 15 disposable blade.

A protecting shelf approximately one mm. in width is made 0.5 mm. from the cutting edge, permitting a controlled incision of this depth for any purpose, such as preplaced grooves for McLean sutures, and so forth. It should be noted that the shelf is limited to one side of the blade so that the other side may be used not only to sight the line of incision but also to permit the blade to be placed directly against a conjunctival flap if necessary.

Fig. 1 (Sills). Guard for Bard-Parker knife blade.

The method of preparation of the guard was that of a routine dental investment casting procedure done by practically all dental laboratories. Cost of the gold was approximately four dollars.

Front Street (3).

* From the San Diego County General Hospital.

SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

CHICAGO OPHTHALMOLOGICAL SOCIETY

April 19, 1954

DR. GAIL R. SOPER, *President*

The clinical meeting was presented by the Department of Ophthalmology of the University of Illinois and the Illinois Eye and Ear Infirmary.

PERIARTERITIS RETINAE

DR. NICHOLAS J. JOHNSON presented C. H., a 35-year-old Negro, who was seen on March 14, 1952, with complaint of pain, redness, and photophobia in the left eye of four days' duration. Past ocular history was negative except for recurrent chalazia. He had had malaria and typhoid while in the Armed Forces. His blood pressure was 138/84 mm. Hg.

The right eye was normal; vision was 20/20+. Vision in the left eye was 20/40. The eye showed marked mixed injection. The cornea had many dustlike pigmented keratic precipitates on the posterior surface. The anterior chambers showed a three-plus flare with a few cells. The pupil was regular and the iris had no nodules. The fundus was seen with 20/100 clarity due to vitreous haze. Tension was 38 mm. Hg (Schiøtz). The impression at this time was acute iridocyclitis and secondary glaucoma.

The patient was placed on scopolamine ointment, neosynephrine, and cortisone drops. A uveitis survey was started. Three weeks later the fundus of the left eye revealed many metalliclike refractile exudative lesions arranged in segmental pattern along the four main arterial branches. Sheathing of the arterioles was also present. The striking feature was the involvement of the arterial tree only. In the upper temporal periphery, however, an old healed chorioretinitic scar was present, measuring 1.5 to 2.0 disc diameters; this was surrounded by three linear hemorrhages.

At six weeks the eye showed minimal injection and a slight aqueous flare. Tension remained at 43 mm. Hg. Vitreous haze was still present. The periarteriolar lesions were still present and, in addition, smaller but similar lesions were seen dispersed between the vessels in the lower quadrants, appearing to be more deeply situated than those first seen. Peripheral fields showed some constriction in the nasal periphery consistent with the old chorioretinitic lesion.

At three and four months, vision with correction improved to 20/20; tension became normal; fundus lesions were much less numerous. The right eye remained uninvolved.

All routine laboratory tests were negative on numerous occasions. PPD showed a plus-three and Brucella a plus-two skin reaction. X-ray studies of chest, hands, and feet were normal. Biopsy of the deltoid muscle was not significant.

At 18 months the lesions along the arterioles had largely disappeared. The small, discrete, metalliclike lesions remained scattered between the vessels. The unusual involvement of the arterial tree prompted a search into the literature.

Duke-Elder discusses a bilateral case reported by Muncaster and Allen which was associated with a granulomatous uveitis following an intradermal PPD test. Thompson and Wright reported one case, also bilateral, associated with iridocyclitis. These two cases and the one now reported have certain features in common:

1. Anterior and posterior uveal tract involvement were present.

2. The fundus lesions involved the arteries.

3. The lesions described as cufflike plaques and yellow refractile bodies appeared similar.

4. The lesions associated with the vessels disappeared gradually over a period of months.

5. No definite etiology was established, but an acid-fast process was suspected.

In the present case, there was unilateral involvement and the periarterial lesions were associated with an old peripheral chorioretinitis.

Eosinophilic granuloma of orbit

Dr. Benjamin Berger said that this is a rare bone disease, only four cases of which are reported in the literature. C. Z., a white girl, aged two and a half years, was first seen at Research and Educational Hospitals on January 11, 1954, with a history of persistent discharge from the left ear, and lumps on the skull and face during the past seven months.

The aural discharge was whitish-yellow and foul-smelling, and responded somewhat to antibiotics but recurred frequently. Each of the lumps was about the size of a prune and seemed to appear overnight. The first appeared in front of and below the left ear; two additional lumps arose in the right occipital region and the left posterior parietal region respectively. They were drained surgically and did not reappear.

X-ray films taken two months after onset of symptoms showed bony defects in the occipital area. The child was drowsy, sleepy and irritable and remained so for four months.

When examined there was a soft fluctuating mass in the left frontoparietal area with a bony defect underneath. X-ray films of the skull showed "several destructive lesions involving the calvarium. One of these is superior to the junction of the sagittal and lambdoid sutures and two cm. to the right. It is the size of a quarter and has irregular margins. Another such lesion is in the left posterior frontoparietal area."

X-ray studies of the long bones and chest were normal.

The mass in the frontoparietal region was aspirated and four cc. of yellowish fluid were removed. Pathology report was "fairly large numbers of inflammatory cells in the fibrinous exudate, with polymorphs predominant. The picture is consistent with that of eosinophilic granuloma."

Laboratory findings showed: Hemoglobin, 9.4 gm.; RBC, 3,700,000; WBC, 11,800, with 68 percent polys, 30 percent lymphocytes and two percent eosinophils.

X-ray therapy was given on February 9th, a half-value layer of 0.95 mm. Cu. 200 k.v., applying 345 r in air with a diameter of 4.5-cm. port to the left temporal lesion, 345 r in air with port of like size to the left preauricular region, and 240 r in air with 4.0 by 2.8-cm. port to the lesion in the posterior occipital region. Inherent filters of 2 mm. Al. and 0.5 mm. Cu. were used; with an added filter of 0.2 mm. Cu. at a distance of 50 cm. and at 25 m.a. The masses regressed promptly.

On February 19th, the right upper lid developed a painless swelling with ptosis and some redness. Examination two weeks later showed a soft red swelling of the right upper lid. The right palpebral fissure was one-mm. smaller than the left. Exophthalmometer readings showed: R.E., 10 mm.; L.E., 11 mm. The remainder of the ocular examination was normal, including ocular motility and fundus.

X-ray films showed "an interruption of the superior border of the right orbit and a lack of bony detail in the area superior to the orbit, with a punched-out lesion in this area, having smooth, well-defined lines. Another such area is noted anteriorly and superiorly to the left orbit."

Without treatment, there has been no apparent progression of the lesion of the right orbit during the past six weeks.

This case has most of the characteristics

of eosinophilic granuloma, being a localized destructive process of bone without systemic manifestations. The localized swellings and destruction of bone occur most frequently in the skull, sometimes in the long bones and ribs, and rarely in the bony orbit.

The microscopic picture consists of large mononuclear histiocytes and eosinophilic polymorphs, with occasional cholesterol crystals and giant cells. An eosinophilia may be found occasionally.

The disease can occur not only in childhood but also in early adult life, and the etiology is unknown. There is no familial incidence. The ultimate prognosis is good, provided local pressure effects are controlled or prevented by therapy.

Eosinophilic granuloma is considered by some to be a rare form of Hand-Schüller-Christian's disease which is a much more widespread disorder of the reticuloendothelial system and cholesterol metabolism. In Hand-Schüller-Christian's disease, xanthomatous deposits occur in the lids, conjunctiva, cornea, orbit, membranous bones of the skull, dura, and optic-nerve sheaths. There is overloading of the cells of the reticuloendothelial system with cholesterol and cholesterol esters giving rise to granulomas packed with xanthomatous cells. The xanthomatous masses can cause exophthalmos or, when located at the base of the brain and pituitary region, can cause polydypsia and polyuria as a part of diabetes insipidus.

Children so affected are often underdeveloped and the disease may be fatal, although most patients over 10 years of age survive. The lesions respond readily to X-ray therapy, but the effect is more often temporary rather than curative.

Foreign bodies after lens extraction

Dr. Albert Tennenbaum said that the finding of retained intraocular metallic foreign bodies deposited during lens extraction at the Illinois Eye and Ear Infirmary first came to attention in October, 1953, when a golden-colored metalliclike foreign body was noted deep in the healed corneal wound of a patient who had undergone cataract surgery one month previously. The following month a similar foreign body was noted on the iris in an eye that had a persistent, unexplained iritis following an uncomplicated lens extraction. In the following months four additional cases were found. In each, a gold-plated Bell erisophake had been used during the operation.

An investigation of the instruments used revealed that every gold-plated erisophake had a roughened surface and, when examined under high magnification, the uneven surface was found to be due to flaking of the gold plating. No similar flakes have been found in eyes operated on for cataract in which capsule forceps had been used. The use of plated instruments has now been discontinued.

Case 1. J. H., a white woman, aged 77 years, on September 1, 1953, had an intracapsular lens extraction with full iridectomy. The postoperative course was uneventful. On October 1, 1953, a yellow-brown metallic foreign body was noted deep in the healed corneal wound near the temporal suture position. This eye has remained pale. Vision is 20/30, corrected.

Case 2. F. C., a white man, aged 64 years, on August 20, 1953, had intracapsular lens extraction with full iridectomy with slight vitreous loss. The eye showed a persistent aqueous flare for five months following surgery despite treatment with cycloplegics and topical cortone. On January 15, 1954, two minute yellowish metallic foreign bodies were seen on the iris surface.

Case 3. F. M., a white man, aged 70 years. On November 18, 1953, an intracapsular lens extraction with peripheral iridectomy was performed. The postoperative course was uneventful. Corrected vision is 20/20. A study of the anterior segment revealed extensive synechia of the iris to the vitreous face. One mm. from the inferior pupillary margin a single metallic foreign body,

golden in color, was noted. The eye was pale.

Case 4. J. N., a 68-year-old white man, was operated on on June 4, 1953, an intracapsular lens extraction with peripheral iridectomy being done. On the first postoperative day a small iris prolapse was noted. This was repaired with an iridectomy and postplaced corneal scleral sutures. A choroidal detachment and flat anterior chamber developed on the 18th day, which subsided spontaneously. Corrected vision is 20/20 − 1. Slitlamp examination reveals eight minute golden foreign bodies on the iris surface near the sphincter margin.

Case 5. C. B., a 77-year-old white man, had an intracapsular lens extraction with peripheral iridectomy on October 3, 1953. The postoperative course was uneventful and he was discharged on the 10th day. During the third postoperative week a choroidal detachment with a shallow anterior chamber was noted. This subsided without treatment; however, anterior and posterior synechias were noted with a more intense iritis. Under treatment with subconjunctival and topical cortone the iritis subsided, and at this time a single metallic foreign body was noted on the iris surface temporally. On November 19, 1953, a full iridectomy was done, removing the foreign body, after which recovery was uneventful. Vision was 20/20 − 2. Unfortunately, the specimen was lost.

Case 6. B. K., a 63-year-old white woman, had an intracapsular lens extraction with full iridectomy on July 1, 1953; there was loss of one cc. of formed vitreous. A small hyphema was noted on the third postoperative day which quickly absorbed. Corrected vision is now 20/20 − 3. On February 15, 1954, a small fleck of gold was noted on the temporal iris surface. This eye has remained pale.

Richard C. Gamble,
Recording Secretary.

OPHTHALMOLOGICAL SOCIETY OF MADRID

May 13, 1954

Congenital aniridia

Dr. Cadenas Ugidos described a case of congenital, total, bilateral aniridia which was associated with macular aplasia and nystagmus in a three-month-old boy. There were no hereditary antecedent malformations, venereal disease, or consanguinity of the parents. Associated with the condition were a congenital umbilical hernia and dyschromia.

Dr. Cadenas Ugidos made a thorough study of aniridia, its historic, anatomic clinical, and histopathologic aspects, taking time to revise some of the most accepted theories in order to explain the pathogenesis of congenital malformations in general. He maintains that these may be due to heredity or to pathologic causes which affect the gametes, the ovum, the embryo, including the fetus in its early stages. He referred to the views of Maranon that such malformations may be hereditary or sporadic and are difficult to differentiate one from the other.

With reference to heredity as a determining factor, he agrees with Duke-Elder that, since many congenital defects of development are transmitted from generation to generation the subject is important.

Our knowledge of the influence which atmospheric factors have on the development of the ovum are more accurate. Several authors have stated that congenital alterations can be produced by changes in the chemical constitution of the saline solutions in which ova of fishes and amphibians developed. In this manner also great importance must be given to many factors which can act as teratogenic agents. Variations in temperature trauma, magnetic and electrical influences, injection of gases, action of X rays and radium and so forth must be considered.

From all this we can realize the great importance which the prenatal condition of the mother has in the determination of congeni-

tal malformations. Circulating maternal toxins, undernourishment, hypo- and avitaminosis, mechanical influences, and intra-uterine influences can also be the cause of these anomalies. In a word, one must emphasize that these pathologic causes according to Maranon affect the hypophyseal-hypothalamic structures and through them produce the malformations.

Dr. Cadenas Ugidos then discussed the pathogenic theories of aniridia, emphasizing that there have been many causes advanced to explain the condition. He recalls the importance which has been given to consanguinity and also to heredity as a dominant characteristic by some authors and either dominant, irregular, or recessive by others. Then he mentioned those which are most accepted—that of De Beck which refers to reabsorption of the iris, that of Seefelder and of Benedette which ascribe it to a fault in the development of the whole ectoderm.

Hess maintains that it is due to a persistence of the remains of the vascular tunic of the lens; Speciali-Cirincioni claims that the cause would be a defect in the development of the whole mesoderm; Manz, Lambeck, and Goldzieher attribute the malformations to an inordinately long contact between the crystalline lens and the posterior surface of the cornea. v. Dusy says that it must be due to an obstacle produced by a tight amniotic membrane.

Rindfleiss and others suggest that aniridia is due to an intrauterine inflammation produced during fetal life. He concluded by saying that all the theories which tend to explain the pathogenesis of aniridia have their vulnerable as well as good points, much depending upon determining the period of the embryogenetic development when the pathologic factor acts and involves the mesodermal and ectodermal tissues.

Finally, he commented on the association of aniridia with umbilical hernia and dyschromia, pointing out that this follows the law of multiplicity of congenital anomalies.

With reference to the hernia he mentioned the fact that, until the third month of intra-uterine life, the walls of the abdomen are incomplete. We may thus surmise that the cause which is responsible for the arrest of growth of these walls also determines the defect of development of the iris which, as is well known, begins at that time. With reference to the dyschromia he said one should take account of the intimate relation between pigmentary disturbances, either congenital or not, and the changes in the hypophyseal-hypothalamic structures involved. But in spite of this the pathogenesis of these pigmentary disturbances is not exactly known. Possibly, as Dr. Galindez-Iglesias has said, it may be a matter of the hypophyseal mechanism in relation to the vestiges of the melanotropic hormone in certain species of animals.

Discussion. Dr. Carreras Matas remarked that:

The etiologic considerations of Dr. Cadenas Ugidos remind me of cases of malformations where careful investigations do not uncover any cause that would explain their appearance. Really the problem of the mutations transmitted by heredity and the sporadic malformations are among the most obscure problems in biology. I am beginning to wonder if the continuous bombardment of cosmic rays on germinal elements do not constitute the basic cause in a large number of these cases of unknown etiology. There is no doubt that this is one of the problems which has to be resolved by the laws of probability as many others in biology.

Glaucoma which usually is found in these cases of aniridia has been attributed to a defective development of the trabecular system, the canal of Schlemm, and its outlets. For this reason I believe it of great interest if Dr. Cadenas Ugidos would follow-up this case, as it may be possible to ascertain the state in which the aqueous veins are found.

Dr. Arjona Trapote: Seefelder attributes a fundamental role in the production of these malformations to a defect in the border of the optic vesicle which should produce the two pigmentary epithelial layers of the posterior surface of the iris. We all

know, following Seefelder, that the pigmentary layer is fundamental to development of the uvea by an inductive action, chemicobiologic in nature. In the zones where there is an absence of the pigmentary layer there is a lack of this inducting stimulus and that membrane does not develop. This is what occurs in the typical coloboma of the choroid. The same occurs in the iris when the pigmentary epithelium is absent, which by induction has to determine the development of its stroma. The same also occurs in the atypical colobomas of the iris which are not referrable to injuries in the closing of the embryonic fissure.

Dr. Marin Amat: Aniridia is a congenital affection, generally bilateral and hereditary, which presents many and varied aspects. I want to refer to the embryologic explanation and to the treatment.

The embryologic explanation is simple. In total aniridia there is an inhibition to formation of the iris; in partial aniridia there is an arrest of development after it began.

In inhibition in the formation of the iris, it seems clear that the edges of the optic cup formed by the secondary ocular vesicle have not grown sufficiently to cross the limits of the equator of the crystalline lens. This occurs, or ought to occur, before the end of the second month of intra-uterine life, at a time when the iris and the ciliary body make their appearance (the sphincter muscle of the iris does not develop until the third month, and the dilator muscle until the seventh month).

Inhibition in the development of the edges of the secondary optic cup before the second month will prevent the formation of the primordial or ectodermal iris. Consequently, there will not take place the production of the mesodermal tissue which has to make up the stroma, the vessels, and the cytologic elements pertaining to the iris whose appearance is much later during the fifth month of pregnancy.

The mesodermal tissue of the iris needs for its development the epithelial substratum as an inducting stimulus. In colobomas of the choroid, because of lack of coaptation of the edges of the cleft of the secondary optic vesicle—and the resulting deficiency of the pigmentary layer of the retina—the choroid does not develop at this level.

The same thing occurs in partial aniridia after the beginning of the formation of the primordial iris. That is to say that there is an arrest in the development of the iris before reaching the end of its evolution.

Treatment of aniridia has to be palliative. One must take into consideration the presence or absence of opacities in the crystalline lens or in the cornea and also the state of ocular refraction. When there are no opacities in the media, one could use a stenopeic lens, or a graduated iris diaphragm. If there are opacities, the latter device would not be of any use. Theoretically, tattooing the cornea with chloride of gold, leaving the pupillary zone free, might be recommended.

Dr. Rio Cabanas emphasized that one must not underestimate the role of heredity in these conditions. In aniridia, some authors have published cases of recessive heredity. In this type of transmission, it is necessary that the recessive factor be coincident with a homozygous character so that it may show itself in an individual. Thus there may pass many normal generations before it shows up in a patient. Moreover, dominants and recessives are not immutable elements but rather, as Just has said, they are "the extremes in a straight line in which there are many intermediate points."

Joseph I. Pascal,
Translator.

MEMPHIS EYE, EAR, NOSE AND THROAT SOCIETY

Epithelial ingrowth cyst

Dr. J. Wesley McKinney reported the case of Mrs. L. R. W., aged 37 years, who was first seen on July 10, 1944.

She was found to have high myopia in each eye (−13.00) and advanced retinitis pigmentosa, the fields being contracted to the 10-degree isopter. There were posterior

subcapsular lens opacities in both eyes.

In 1947, the lens opacities had reduced the vision to 4/200 in each eye. In early November, 1947, uneventful cataract extractions with peripheral iridotomy were done on each eye, using three McLean-type silk sutures and a limbus-based conjunctival flap.

On January 21, 1948, two months after cataract extraction, she awoke with pain in the left eye. Examination revealed a slight ciliary injection and a few cells in the anterior chamber. This appeared to be an acute iritis which cleared completely in a matter of a few weeks. Five months following surgery, cataract refraction revealed vision of 20/25, J1, in each eye.

On July 6, 1948, nine months after surgery, the patient noticed a yellow spot in the left eye. There had been pain in the left eye at night for about a month. Examination revealed a yellow mass, measuring approximately 3.0 by 4.0 mm. and involving the stroma of the iris and disappearing beneath the limbus temporally. Although the mass appeared dense, it transmitted light well, and it was thought to be a cyst. There was slight edema of the cornea over the mass.

Pain, ciliary injection, and tenderness increased, and finally there was hypopyon. The cyst had increased in size to measure 5.0 by 6.0 mm. No treatment altered the course of the disease. Consequently, it was decided to excise the cyst.

A conjunctival flap was dissected, three McLean sutures were inserted, and the anterior chamber was opened by scratch incision. The cyst was ruptured upon incision of the iris, but apparently all was removed. The hyaloid fortunately did not rupture. Recovery was uneventful and, on December 11, 1948, the vision was corrected 20/25 mostly.

In April, 1949, another cyst developed on the iris; this time behind the nasal limbus. There were few short bouts of pain and ciliary injection, but finally in August, 1949, a severe flare-up with hypopyon and elevation of tension occurred. The cyst was excised in the same way as the previous one and, at the same time, a cyclodialysis was done below. The postoperative course was uneventful. On November 19, 1949, vision was corrected to 20/30. Tension had been kept under control with pilocarpine, and later with D.F.P. The fields had been reduced in both eyes to just within the five-degree isopter.

The patient moved out of town in early 1952 and was not seen again until October, 1953. At this time, there was an elevation of pressure in the left eye to 37 mm. Hg (Schiøtz) despite miotics. Cyclodiathermy punctures were done. The postoperative course has been uneventful, and to date the tension has been controlled.

Parkinson's syndrome

Dr. Fred C. Wallace presented the case of Mrs. D. C., aged 64 years, a white woman, who was seen on November 2, 1953, for an eye examination because of general eye discomfort, dizziness, and occipital headaches of several months' duration. Examination by her family doctor revealed nothing to account for her symptoms. One month ago she was examined by an eye physician in her home town because of the same complaints and new lenses were prescribed without relief. Her general health had always been good.

Eye examination revealed normal vision with glasses. There was very poor convergence, measuring 45 cm., and an inability to elevate her eyes beyond the horizontal. There was no vertical phoria or tropia at near or distance. Eyeground examinations revealed a grade-I arteriolosclerosis with normal discs. Ocular tension, visual fields, and pupillary response were normal.

Consultation by a neurologist diagnosed the condition as Parkinson's syndrome. Aside from a slight mask-face appearance there were none of the classical signs of this disease such as tremor, cogwheel movement, or shuffling gait. Her eye signs also suggest Parinaud's neurologic syndrome with the lesion involving the subthalamic region

in front of the corpora quadrigemina. She was referred back to her family physician for treatment.

Ptosis operation

Dr. C. C. Shipp, Jr., presented the case of a 76-year-old white man who noticed weakness in raising his eyelids about one year ago, which he attributed to a severe chest "cold." His lids failed to open particularly on arising every morning, and now he has to hold his head backward or raise his lids manually to see. At times, his lids will rise slightly.

Past history is negative for any cerebral vascular accidents and there is no history of weakness of the extremities, diplopia, speech defects, difficulty in swallowing, or tremors.

When first seen in the clinic on May 26, 1953, examination revealed bilateral ptosis, with only slight elevation of either upper lid, with the palpebral fissures measuring two mm. Extraocular movements were normal, with apparently good superior rectus function, O.U. The remaining examination was negative except for grade-II arteriosclerotic vessel changes in the fundi.

The patient was given an injection of one cc. of 1:2,000 prostigmine methylbromide (combined with 1/250 grain of atropine sulfate) and no response was noted, and myasthenia gravis was believed eliminated as a possible diagnosis. The diagnosis of senile ptosis, bilateral myogenic (primary atrophy of levator muscle fibers), was made. The possibility of a neurogenic cause, central in origin, involving the oculomotor nerve and affecting only the levator muscle by partial ptosis and not involving to any degree the superior rectus function was also considered. Trauma, inflammatory neoplasm, and other causes were believed eliminated.

Clinic consultation was obtained. It was determined that (1) the levator could be shortened and/or advanced, (2) the lid could be attached to the superior rectus, or (3) the lid could be suspended to the occiptofrontalis. The latter type of operation was decided upon because of the patient's age (76 years), and the Friedenwald-Guyton rhomboid suture method was chosen because of ease of performance.

On May 28, 1953, a Friedenwald-Guyton procedure was done on right side, with a 2-0, white-braided silk suture raising the right upper lid margin one mm. above the upper limbus. By the eighth day, edema had subsided and there was only slight tenderness at the lateral frontal incision where the suture was tied. The patient could close his lids satisfactorily. He returned one week later complaining of tenderness and slight drainage from the lateral frontal area. He was placed on Gantrisin orally. One week later, some three weeks postoperatively, he was found to have no complaints.

On July 14, 1953, the patient returned with a draining sinus of the right frontal area where the suture was tied. He was placed on penicillin triple-sulfa tablets, and the amount of purulent looking material diminished.

The patient was followed from week to week through July and August. Several cauterizations with silver nitrate failed to deter a small granuloma at the sinus tract on the forehead. On September 3, 1953, nearly four months after the original Friedenwald-Guyton procedure, the suture was grasped with forceps in the sinus area of frontal region and easily removed after cutting. The sinus tract has now nearly healed.

This case is presented to demonstrate one of many procedures to correct a ptosis due to paralysis of the levator palpebrae. It is considered a simple surgical procedure but, as demonstrated in this case, it has its disadvantages.

At present, most authorities recommend bilateral surgery and attachment of the lid to the superior rectus muscle, if it is functioning. It is hoped that this case will bring forth discussion of whether the procedure

was the ptosis operation of choice, as well as advantages and disadvantages of other ptosis operations.

Sarcoidosis treated with cortisone

Dr. Oscar Dahlene, Jr., on March 10, 1953, first presented this patient with general and ocular sarcoidosis. After intensive therapy with local and systemic cortisone, the lesions regressed. This follow-up report shows that:

The eyes remained quiet until in July, 1953, when the cornea of the left eye began to undergo degenerative changes, largely in the exposed area. At the follow-up visits to clinic between April and July, 1953, there were seen deep vessels in the cornea with much pigment along their course. These vessels gradually infiltrated the exposed area of cornea in the deeper layers, and were very noticeable as swirling brown lines under low-power magnification.

Despite continued use of cortisone eye drops, uveitis flared up again in July, at the time the first corneal changes were noted. The eye became quite inflamed and did not respond to the usual uveitis therapy. The cornea became ulcerated marginally. There was a massive hypopyon of the anterior chamber and the ulceration of the cornea proceeded to a complete ring despite paracentesis. Cortisone was not employed during the period of ulceration.

On September 21, 1953, the left eye was enucleated because of great pain and imminent danger of rupture of the very thin cornea. The patient had been on systemic chloromycetin, Gantrisin, and penicillin, fever therapy, and local antibiotic instillations. Nothing altered the course of the destructive process.

The right eye retains 20/70 vision, with a gradually increasing cataract and no change apparent in the anterior segment.

Allergic reaction to terramycin

Dr. Philip Meriwether Lewis presented a patient who showed a marked congestion of both eyes, probably due to an abnormal reaction to terramycin.

Mrs. M. C., a white woman, aged 54 years, was seen in July, 1953, as a routine refraction case. There was a high degree of mixed astigmatism, with best vision 20/30 and J2. Nothing abnormal was found except a small red area about three mm. in size in the lower temporal quadrant of the right eye. The area was slightly elevated and a little tender, but she did not mention it in the complaint, nor did she know how long it had been present. A diagnosis was made of episcleritis. Zinc drops in a buffer solution were prescribed and a change made in her glasses.

Three weeks later she returned complaining of a flashing of light before the right eye. The fundus was found normal and a roughly taken visual field negative. The episcleral spot appeared much less noticeable. She stated that she was ill with a kidney and colon infection and was under the care of specialists for these ailments.

Twelve days later she returned because both eyes had become very red and swollen about six days previously. This followed taking terramycin for her colon and kidney trouble. She had taken one 250 mg. capsule every four hours for about four days. She claimed that the drug made her ache all over and feel very badly, but did not cause a skin eruption or sores on any mucous membranes except her eyes.

The appearance of both eyes was rather startling. A ring or collar about six-mm. wide extended all around both eyes just posterior to the limbus. A fairly clear area about two-mm. wide separated the limbus all around from the anterior border of the congested "collars." The congested areas were thickened but there were no actual nodules and there was no tenderness. The surface of the conjunctiva over these "collars" was a little irregular but was not broken. Vision was unaffected.

It was felt the condition was an unusual form of a drug reaction. As the drug had

been discontinued and there was no particular complaint except the appearance she was assured that it was not serious and that a rapid recovery was probable. Cortisone ointment (1.5 percent) was prescribed to be used locally three times daily.

When seen again eight days later the eyes were much improved but she complained of a rough feeling or sand in both eyes. The congestion above and below had disappeared but was still present in the palpebral fissures, especially temporally. The conjunctival surface of the congested areas stained with fluorescein and under the biomicroscope appeared to be denuded in many tiny little spots. There was still no secretion, and smears and cultures were negative.

Daniel F. Fisher,
Secretary of the Eye Section.

YALE UNIVERSITY CLINICAL CONFERENCES

April 30 and May 28, 1954

Dr. R. M. Fasanella, *presiding*

Diagnosis of strabismus

On April 30th, Dr. Joseph I. Pascal, New York, spoke on "The method of concordance in the diagnosis of strabismus."

This method, though originated by Prof. Marquez more than 30 years ago, is practically unknown to American ophthalmologists. It has never been described in any English text on ophthalmology. The method requires no extensive or expensive apparatus, and is used to a considerable extent in Spanish-speaking and other foreign countries.

The method comprises a co-ordinated system of diplopia tests, the findings of which are plotted on a muscle schema. The results pointing either to paralysis or spasm are grouped around the various muscles by the symbols, P and S. That muscle which has the greatest concurrence or concordance of the same symbol is the affected muscle.

The five tests used are (1) to determine by the vertically separated images which eye is higher and which eye lower, (2) to determine in what part of the field the vertical separation of the images is most marked, (3) to determine the effect of tilting the head to either shoulder on the vertical separation of the images, (4) to determine the horizontal relation of the images, whether crossed or uncrossed, (5) to determine the slant of the false image.

The method is most valuable in affections, paralysis, or spasm of the vertically acting muscles. But it also has some unique features in helping the diagnosis in affections of the horizontal muscles. This is based on evaluating the secondary actions of the horizontal recti.

Dr. Pascal gave practical problem cases illustrating the application of this muscle schema.

Discussion. Many questions on details of the practical problems were asked.

Dr. Alexander Van Heuven pointed out some similarities in this method and that of Hess.

Dr. C. C. Clarke raised the question that, since this was a subjective method, it would be difficult to use for children who comprise the majority of strabismus patients.

Endogenous uveitis

On May 28, 1954, Dr. Conrad Berens, New York, spoke on "Endogenous uveitis: Etiology, diagnosis, and treatment." His paper was based on work done with Dr. Henry N. Bronk and Dr. George Z. Carter, New York.

Discussion. Dr. DeSuto-Nagy: I, too, am impressed with the unreliability of the clinical diagnosis of sinusitis, even when the X-ray and clinical examination is negative. I think it is important to recognize that we cannot rely on skin tests, and we must be very careful in treatment with tuberculin. I feel that we cannot throw out the whole concept of focal infection if removal of one focus does not result in improvement.

Dr. Berens: Some patients know they

have sinusitis; some don't. Constant questioning is important, even when the E.N.T. specialist has given a negative report.

DR. YUDKIN: Do you have any information on cases of primary glaucoma with subsequent history of inflammation? Could they be due to the therapy used?

DR. BERENS: We don't have the pathologic data yet. One man might feel that operation caused the reaction. I think that you should be able to tell that. I feel that some of these are low-grade toxic infections, some have neurovascular factors, and some psychologic factors, which are important in uveitis too.

DR. YUDKIN: In some cases when pupils are dilated for examination and some inflammation uncovered that wasn't suspected, I believe long-continued miotic therapy might have done it.

DR. FREEMAN: I don't believe medication would affect the uveal tract in that way, basing my opinion on experimental animals. Also, the primary glaucomas operated on with poor results and complicated by uveitis are a difficult group to evaluate because the eye pathology is usually examined a long time afterward. If this group alone were to be taken out of the so-called primary glaucomas, it would help considerably.

William I. Glass,
Recording Secretary.

OPHTHALMIC MINIATURE

APHAKIA

Bulletin of Progress

No. 1

My little dog has shrunken
  My kitty too is small,
While all the people that I pass
  Seem not to be so tall.
And when I reach my hand for things
  Those thing are really there,
I walk with more assurance
  So people cease to stare.

No. 2

Tonight I looked up to the sky
  And silver stars shone there,
The same bright stars that used to shine
  Until the sky went bare.
Tears blurred my vision as I looked,
  For it was God and you
Who let me see the stars once more
  Studding the sky of blue.

ANONYMOUS

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AN EPITAPH FOR RETROLENTAL FIBROPLASIA

Retrolental fibroplasia is a unique disease in the annals of medicine. About 1942 it bowed into the ophthalmologic firmament supposedly as a new and unheralded problem, caused blindness in approximately 8,000 infants, and has now bowed out, all within a span of about 13 years. There was, of course, great consternation as to its nature. Was it a new disease, or an old disease with increased incidence? Why was it confined almost exclusively to the United States? Why did it pinpoint the eye? These questions and many others were the imponderables.

The disease was gradually identified and delineated as an entity so that we now have a remarkably complete picture of the clinical manifestations, course, pathology, and even etiology which has been established by clinical observations as well as by animal experimentation.

Now that oxygen has been incriminated

and the disease has been proved to be a man-made one, its incidence depending upon pediatric practice, being more or less proportionate to the economy of the area, we can explain many of the features which were formerly so mysterious. We can readily understand why the disease occurred primarily in this country during the war years and then gradually appeared all over the world commensurate with economic recovery. We realize good reasons now for the variations in incidence between different cities in the United States and even in the same locale at different times; for the relatively high incidence in Northern Ireland compared to Southern Ireland and for the absence of the disease among off-spring of native mothers after the war in Germany, but its occurrence when native mothers were married to American military personnel. No wonder it was viewed as a curse peculiar to North Americans.

It is interesting to note that coincident with the outbreak of the disease in 1942 there occurred among pediatricians an active interest in the administration of oxygen to premature infants. This was a natural and understandable sequence to the observation that oxygen corrected the irregular periodic respirations, which were apparently due to anoxia. The Boston school was particularly active in promoting this seemingly good idea, and it was here in the beginning that the incidence of retrolental fibroplasia was so high that Terry made his original classic observations.

The trail which has led to the successful goal has been blazed by many noteworthy contributions. In this country in addition to that of Terry it is in order to single out the work of Owens and Owens who described the development of the disease, to the work of Kinsey who culminated his years of relentless efforts by spear-heading and integrating the research team supported by funds from the National Institute of Neurological Diseases and Blindness, and to the work of Patz in producing the disease experimentally in animals. The National Society for the Prevention of Blindness maintained its encouraging support through its inspiring leader, Dr. Franklin Foote.

Although retrolental fibroplasia had its inception and greatest impact in the United States, it is to the glory of our English and Australian colleagues that they made major contributions to its solution. The names of Ashton, Crosse, Ryan, Campbell, K., Campbell, F. W., and Michaelson are indelibly etched in the saga of this disease.

A most noteworthy and pertinent sequence of reports appeared in the British literature. In 1948, Michaelson concluded from his investigations of the development of the vascular system of the retina that the growth of new vessels in the retina takes place pre-eminently from the veins; that, if a vein and an artery are close to each other, growth takes place predominantly from the side of the vein remote to the neighboring artery; that the spread of capillary growth toward an artery extends for only a certain distance, leading finally in the definitive human eye to a well-marked capillary free-space around the arteries. He postulated a metabolic factor in the retina capable of effecting the growth of blood vessels and he concluded that this factor, which is present in a gradient of concentration differing in arterial and vein neighborhoods, determines the distance to which capillary growth will extend. In retrospect this report marked the dawn of our understanding of the pathogenesis of retrolental fibroplasia. Further important light was shed in 1951 by the publication of F. W. Campbell's work on the influence of a low atmospheric pressure on the development of the retinal vessels. He showed that Michaelson's capillary-free zone was due to the growth-inhibiting effect of the oxygen tension around retinal arteries. He concluded that retinal vessels grow toward an area of low oxygen tension and cease to extend in areas of higher oxygen tension.

Ashton then applied these basic findings

to the problem of retrolental fibroplasia, and this culminated in his well-known experimental production of the disease in animals.

At the time when oxygen was strongly suspected as a causative factor in retrolental fibroplasia but its exact role difficult to ascertain by isolated reports, a co-operative project on a national scale was organized under the aegis of the National Society for the Prevention of Blindness and the National Institute of Neurological Diseases and Blindness. The report of this joint group, which conclusively convicts oxygen (which nails oxygen to the cross) is given in the symposium published in this issue of THE JOURNAL.

This national effort to eradicate retrolental fibroplasia was supported by funds from the National Institute of Neurological Diseases and Blindness, a federally financed research organization at a cost of $51,000. This resolved an enigma, the national cost of which has been estimated at $800,000,000. A fairly good return on the investment! I doubt if so much has accrued from so little in the expenditure of the Federal budget which appropriates approximately one-thirty fifth of one percent for medical research.

Putting the final solution to this problem on a national level gave it scope and stature and the conclusions should be heeded. Derelict as it may seem, there are apparently many patients who are not receiving the benefits. The February, 1955, issue of the *Journal of Pediatrics* states "Numerous hospitals have not yet discontinued routine oxygen administration to premies and very few have made adequate provision for testing concentration (40 percent). If currently available information is disregarded and an infant becomes blind, the burden that lies on the physician and the hospital is unpleasant to contemplate."

A. B. Reese.

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CHICKENPOX AND ZOSTER*

Most American ophthalmologists, for a number of reasons, are not as familiar as they should be with the excellent and instructive editorials, or leading articles, of that great medical periodical, *The Lancet*, published weekly in London. It is proposed, therefore, to reprint in THE JOURNAL, from time to time, and always with the gracious permission of the managing editor of *The Lancet*, such leading articles as are considered to be of major interest and importance to ophthalmologists. The following article is the first of these "guest editorials," for which we are grateful. It gives us much food for thought. Herpes zoster, when it affects the eyes, is one of the most serious and difficult problems with which we cope. Ed.

In 1892, von Bokay[1] first drew attention to the connection between herpes zoster and chickenpox, and his observations have since been repeatedly confirmed. This association has been investigated by epidemiologists, experimentalists, and bacteriologists, and as a result a clearer picture of the etiology of zoster infection is emerging. There is no doubt that outbreaks of what appears to be chickenpox follow cases of zoster much more commonly than can be accounted for

*Reprinted by permission from *The Lancet*, **247**:1314, 1954.

by chance. There are some unusual features in the relationship of the two infections. Thus, second attacks of chickenpox or zoster are rare, but zoster commonly occurs in children or adults with a previous history of chickenpox.[2] In at least two isolated communities where cases of zoster occurred, no subsequent cases of varicella were recorded;[3] also the age and seasonal distributions of the two infections are quite different. The simplest explanation of these findings is that after chickenpox infection the virus may remain latent, and be activated by such factors as cold, pressure on a nerve, or treatment with arsenicals, with consequent herpes zoster. Since patients with zoster are not infected in their respiratory tracts they are poorer transmitters of virus than are patients with chickenpox. This hypothesis requires that the viruses of chickenpox and zoster should be identical, and a great deal of evidence in this direction has been accumulated.

On page 1299 of this issue (of the *Lancet*) Dr. Hope Simpson shows that people infected with chickenpox derived from a case of zoster were subsequently immune for a few years to ordinary chickenpox infection; similarly people who had previously had chickenpox were not infected when exposed to virus derived from a case of zoster. These observations are in line with experimental findings. Kundratitz,[4] in 1925, inoculated children with vesicle fluid from cases of zoster. In 17 out of 28 inoculated children a local vesicular eruption developed, which was followed in some cases by a generalized eruption indistinguishable from chickenpox; and chickenpox developed in contacts of the inoculated children after the usual incubation period. Kundratitz failed to infect in this way adults, or children who had previously had chickenpox; and he also failed to infect with chickenpox-vesicle fluid children who had recovered from infection induced with zoster fluid. Bruusgaard[5] confirmed most of Kundratitz's findings, and he was struck by the frequency with which contacts of children inoculated with zoster fluid developed what was clinically and histologically indistinguishable from chickenpox 14 days after exposure. Laboratory findings point to close similarities between the two etiologic agents. The skin lesions produced by zoster and chickenpox are histologically similar, and both contain characteristic intranuclear inclusions. Neither virus can be grown in laboratory animals nor fertile hen's eggs, but serologically the two have been shown to be related. Paschen[6] demonstrated that elementary bodies present in zoster-vesicle fluid were specifically agglutinated by convalescent serum from cases of zoster; and Amies[6] found cross-reactions in agglutination tests employing elementary bodies and sera from cases of chickenpox and zoster. Cross-reactions in complement-fixation tests with extracts of infected crusts were reported,[7] although not always confirmed; more convincingly, Brain[8] found that vesicle fluid from cases of zoster and chickenpox fixed complement equally well with zoster or chickenpox convalescent sera. Weller[9] has found that chickenpox and zoster-vesicle fluid produce small foci of degenerated cells with intranuclear inclusions in human embryonic cells grown in tissue-culture. Curiously, most of the virus in these cultures remained within infected cells, and in order to demonstrate its serologic characters antibody conjugated with a fluorescent dye was used. By this technique Weller and Coons[10] showed that antibody reacting with chickenpox or zoster virus to an almost identical degree appeared during convalescence in the sera of chickenpox and zoster patients.

This weighty evidence seems strong enough to suport what has been called the monistic theory—that zoster and chickenpox are different manifestations of infection by the same virus, zoster being usually a reawakening of a latent infection.

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INTERNATIONAL COUNCIL OF OPHTHALMOLOGY

The International Council of Ophthalmology met in Paris, on May 7, 1955. There were present: Duke-Elder (president), Berens (vice-president), Hartmann (secretary), Amsler (treasurer), Bietti (International Organization against Trachoma), Franceschetti (Association for the Prevention of Blindness), Samuels (president of the last congress), Coppez (president of the next congress), Arruga (Spain), Charamis (Greece), Palomino Dena (Mexico), Paufique (France), Thiel (Germany), Weve (Holland).

Apart from dealing with current business, the following are the most important decisions taken by the Council.

I. *Index Ophthalmologicus.* In accordance with the statutes of the council, an *Index Ophthalmologicus* was published at the time of the International Congress in 1954. The sale of the *Index* has, however, up to the present been very slow, involving the council in considerable expense. It was thought that this was due to the fact that it was insufficiently known. The *Index* contains the names and addresses of ophthalmologists in most countries of the world and information on hospitals, journals, and ophthalmologic societies in these countries. It can be obtained, at a price of $2.75, from Dr. A. C. Copper, Coehoornsingel 42, Zutphen, Holland. Despite the disappointing sales the council decided to publish a new *Index* at the time of the congress in 1958, believing that, once ophthalmologists generally get to know the value of the book, it will eventually become a paying proposition.

II. *International Dictionary of Ophthalmologic Terms.* This dictionary is being prepared by Alvaro, Amsler, Bietti, and Duke-Elder, and it is hoped that it will be available before the time of the next International Congress. In the dictionary, ophthalmic terms will be translated into six languages: English, German, Spanish, French Italian, and Latin.

III. *Subcommittee for the Gonin Medal.* The term of office of the old committee had expired; the following were elected:

Ex officio members: Duke-Elder, Streiff.

Members: François, Friedenwald, Karpe, Müller, and Nordmann.

Substitute members: Eliott, Lo Cascio, Malbran, Ida Mann, and Nakamura.

IV. *Committee for the Standardization of Color Vision.* At its last meeting the International Federation of Ophthalmological Societies had decided that examination of color vision in transport workers should be carried out with the pseudo-isochromatic tables, and for this purpose had initially accepted the Ishihara charts It was, however, decided that any new tests which appeared from time to time should be recommended if they were considered equally suitable. A committee was formed to deal with this matter, consisting of L. C. Thomson (Medical Research Council and Institute of Ophthalmology, London), Yves Le Grand (Collège de France, Paris), Louise Sloane (Wilmer Institute, Baltimore), and J. Zanen (Brussels).

V. *Road safety.* A committee consisting of Bietti, Goldmann, and Dubois-Poulsen was formed by the council to study the visual danger to drivers of roadside advertising and the placing of roadside objects at regular intervals. The questions raised were in how far advertisements caused the driver to divert his eyes from the road in the first

place, and in the second the danger of rhythmic stimulation of the retina in causing nervous symptoms in some persons.

VI. *Congress in Montreal-New York in 1954.* The *Acta* of the XVII International Congress will be published in three volumes and should appear toward the end of 1955.

VII. The next meeting of the council will be held in England in the spring of 1956.

CANADIAN OPHTHALMOLOGICAL SOCIETY

(18th annual meeting)

The 18th annual meeting of the Canadian Ophthalmological Society was held at Bigwin Inn, Muskoka, Ontario, on June 14th to 16th. The meeting was a memorable one owing to the presence of many distinguished guests. This was largely due to the fact that a conjoint meeting of the British Medical and Canadian Medical Associations took place the following week in Toronto. Several ophthalmologists from Great Britain and Australia made arrangements to be present at both meetings. Three honorary guests added greatly to a program which was already distinguished. Sir Norman L. Gregg of Sydney, Australia, gave an interesting account of the present knowledge of the relation between rubella and congenital cataracts, a relationship which he was the first to note. He reviewed the knowledge contributed by many, including that by himself, to this most interesting topic.

Mr. J. H. Doggart of London, England, presented an illustrated discussion of corneal pigmentation. He covered the whole gamut of pigmentations, both of the exogenous and endogenous types.

Mr. J. W. Tudor Thomas of Cardiff, Wales, presented an exhaustive discussion of the corneal epithelium, dealing with it embryologically, phylogenetically, and histologically, and discussed its physiologic and clinical aspects.

It was unfortunate indeed that a fourth guest—Dr. M. E. Alvaro of São Paulo, Brazil, could not be present owing to ill health.

Members of the society rounded out the program with a most interesting and instructive series of papers. They were the following:

1. The value of orthoptics and the treatment of strabismus: Dr. Maria Arstikaitis and Miss Anne Condi, Toronto.
2. The elimination of suppression and the development of the recovery point in the treatment of convergent insufficiency: Dr. C. E. Davies, Vancouver.
3. Cholesterol containing granuloma of the orbital wall: Dr. John V. V. Nicholls, Montreal.
4. Metastatic tumors of the eye and orbit: Dr. J. Boulanger, Quebec.
5. Amblyopia in females: Dr. R. M. Ramsay, Winnipeg.
6. Bowen's disease (intraepithelial epithelioma of the cornea and conjunctiva): A clinico-pathologic study: Dr. John C. Locke, Montreal.
7. Congenital glaucoma: Dr. T. J. Pashby and Dr. J. A. Halliday, Toronto.
8. Sclerotomie et debridement de l'angle irien dans le glaucome infantile: Dr. Jules Brault and Dr. Roland Cloutier, Montreal.
9. Peripheral iridectomy in angle-closure glaucoma: Dr. Samuel T. Adams, Montreal.
10. Cirsoid aneurysm of the orbit: Dr. Arnold H. Katz, Montreal.
11. The role of scleral stretch in ocular refraction: Dr. A. Lindsay, Winnipeg.
12. A clinical follow-up study of retinal detachments: Dr. H. M. MacRae and Dr. R. F. Cowan, Toronto.
13. Newer developments in the therapy of uveal inflammations: Dr. Henri Pichette, Quebec.
14. Results of a survey of eye viruses in Canada: Dr. H. L. Ormsby, Toronto.
15. Traumatic aniridia: A case report: Dr. R. G. C. Kelly, Toronto.

An innovation at this meeting, as far as this society is concerned, was the presentation of series of papers in the form of a symposium. The symposium was by Clement McCulloch and D'Arcy Macdonald, R. K. MacDonald, Harold Sniderman, and Bernard Teichman, and dealt with various aspects of their studies on glaucoma carried out at the Toronto Western Hospital. Their topic was developed around the meticulous taking of the intraocular pressure at two-hour intervals in a large series of patients

suffering from different types of glaucoma. They showed that, in the chronic simple type, there are at least four different patterns of diurnal tension variation, and concluded that the determination of this diurnal pattern is an exceedingly important piece of information to have when dealing with this disease. It is important to have a full knowledge of the diurnal tension variations in order to be able to give a prognosis, to plan conservative treatment, and to decide when it is necessary to advise surgery. This study has made a considerable contribution to the knowledge of glaucoma.

The meeting was brought to conclusion by the business session at which the following officers were elected for the next year: President, Dr. Henri Pichette, Quebec; vice-president, Dr. John MacLean, Winnipeg; secretary, Dr. R. G. C. Kelly, Toronto; treasurer, Dr. B. Alexander, Montreal.

The next meeting will be held at the Chateau Frontenac in Quebec City on June 7, 8, and 9, 1956.

John V. V. Nicholls.

OBITUARIES

WALTER ROBERT PARKER
(1865-1955)

Dr. Walter Robert Parker died April 1, 1955, at his home in Grosse Pointe, Michigan, after an illness of many years. Dr. Parker was born October 10, 1865, in Marine City, Michigan, the son of Leonard Brooks Parker and Jane Sparrow Parker. He married Margaret S. Watson December 28, 1907, and there were no children. Mrs. Parker died in 1936.

Dr. Parker's preliminary education was received in the Marine City Public Schools, later he attended the Michigan Military Academy. He received his B.S. degree from the University of Michigan in 1888 and his M.D. degree from the University of Pennsylvania in 1891.

His postgraduate training was extensive for his time. He was intern at St. Joseph's Hospital, Philadelphia, in 1891-92. He then interned in Children's Hospital, Philadelphia, the following year (1892-93). Ophthalmologic training was obtained by a year (1893-94) at Wills Eye Hospital and postgraduate study in Vienna in 1896.

WALKER ROBERT PARKER

Dr. Parker then moved to Detroit, Michigan, where he opened an office limiting his practice to diseases of the eye and ear. He became clinical professor in ophthalmology, Detroit College of Medicine, in 1899, and remained at this post until he was appointed clinical professor in ophthalmology at the University of Michigan in 1905. He was appointed professor of ophthalmology, University of Michigan, in 1907, and held this post until 1932 when he retired from the university continuing as emeritus professor of ophthalmology until his death. During his association at the University of Michigan he conducted a part-time practice in ophthalmology in Ann Arbor and Detroit, Michi-

gan. He was consultant in ophthalmology at Harper and Woman's Hospitals in Detroit and St. Joseph's Hospital in Ann Arbor. At the University Hospital, Ann Arbor, where he was chairman of the Department of Ophthalmology, he established one of the first three-year progressive residency training programs in ophthalmology, and this progressive training program has been a model for many parts of the country to this day.

Outstanding among the many citations and honors bestowed upon Dr. Parker during his active years were the conferring of honorary degrees of doctor of science from the University of Pennsylvania in 1926 and from the University of Michigan in 1935. He received the Knapp Medal from the Section of Ophthalmology of the American Medical Association in 1916 for his research on "The relation of tension of the eyeball to papilledema." He made numerous contributions to the ophthalmic literature and at one time was a member of the editorial staff of the *Archives of Ophthalmology*.

Dr. Parker's military connections were high points of interest for him. He loved to recount experiences as an ensign in the United States Navy in 1898 during the Spanish American War when he served on the USS *Yosemite*. Between 1917 and 1919 he was colonel, Medical Corps in charge of the Division of Head Surgery in the Office of the Surgeon General, Washington, D.C.

Membership in professional societies saw his greatest interest in the American Medical Association of which he was chairman, Section of Ophthalmology, in 1916; president, American Academy of Ophthalmology and Otolaryngology, in 1922; president, American Ophthalmological Society, in 1928; member of Council, International Congress of Ophthalmology; French and British Ophthalmological Societies, and fellow of the American College of Surgeons. During his college years he was a member of the Delta Kappa Epsilon and the Nu Sigma Nu fraternities. He was an active participant in the Detroit City Club, the University Club of Detroit, the Detroit Country Club, Grosse Pointe Club, and the Yondotego Club.

For all those who knew Walter Parker, his passing has meant a deep personal loss. He exemplified the old school of professional men who maintained the atmosphere of a perfect gentleman at all times. He was a fine teacher, interested in the Arts as well as in his own profession, and displayed the qualities which marked him as a man of broad intellectual attainment.

F. Bruce Fralick.

CLYDE ALVIN CLAPP
(1880-1955)

The death of Clyde Alvin Clapp at his home in Baltimore on April 9, 1955, was not unexpected. An exploratory operation had revealed inoperable carcinoma of the stomach. With indomitable courage he continued with his practice and hospital duties until his strength failed.

Ophthalmology has lost an outstanding figure. Those of us who knew him well have lost a true friend. He was a first-rate clinician who enjoyed teaching and over the years he made a real contribution. He had a direct approach to clinical problems and to his students he always insisted that distinction be made between fact and fancy. In his private practice and hospital appointments he enjoyed unusual opportunities as regards clinical diagnosis and he always made available to his colleagues anything of interest that he was studying. He was engaged in investigative work during almost his entire professional life. His book, *Cataract: Its Etiology and Treatment*, reflected his wide knowledge and excellent judgment. As a contributor to ophthalmic literature his papers were carefully written reflecting his industry and wide knowledge. He had organizing ability and administrative capacity as evidenced by his holding the post of

CLYDE ALVIN CLAPP

chairman of the staff of the Baltimore Eye and Ear Hospital up to the time of his death.

Dr. Clapp belonged to many societies, included among which were the American Ophthalmological Society, which he joined in 1922; American College of Surgeons; American Academy of Ophthalmology and Otolaryngology; and the Ophthalmological Society of the United Kingdom. For many years he was associate professor at The Johns Hopkins University and Hospital and he served as professor of ophthalmology at the University of Maryland. He was professor emeritus of both institutions at the time of his death.

In 1905, Dr. Clapp married Lillian A. Dickson who died in 1914. Two sons survive, Roger Alvin and Clyde Melvin. In 1928, he married Ellen L. Richardson who survives him.

The warm and gracious hospitality of Dr. and Mrs. Clapp was enjoyed by a host of professional and other friends. Both of them enjoyed travel, and over the years they visited many parts of the world, always recording their trips with excellent photographs. Many of us have enjoyed their magnificent pictures.

During the last few years he increasingly enjoyed visiting his farm which is situated close to Baltimore and where his two sons have their home.

Dr. Clyde Alvin Clapp's passing is a great loss to those who worked for him and with him.

Frank B. Walsh.

CORRESPONDENCE

EPITARSUS

Editor,
American Journal of Ophthalmology:

I should like to comment upon an article on congenital symblepharon by Dr. Wallace Friedman which appeared in the February, 1955, **39**:237, issue of THE AMERICAN JOURNAL OF OPHTHALMOLOGY.

The shape of the picture given and the description and pathology report of the case show that it is a case of a congenital abnormality known by the term *epitarsus*. This abnormality was first described by Sharpringer in 1899 and appears in the upper and lower eyelid.

The epitarsus is congenital and usually causes no subjective trouble. It appears more often in those of Jewish decent (Kirsch) and in the Japanese people (Inoge).

Wibaut has described 24 cases of which 12 refer to the upper, seven to the lower, and five to both eyelids. Fronimopoulos presented four cases to the Greek Society of Ophthalmology in 1948, all of which referred to the upper eyelid. I also had the opportunity to observe two cases involving the upper eyelid, of which one was that of an American lady.

(Signed) B. Adamantiadis,
Athens, Greece.

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Editor,
American Journal of Ophthalmology:

Thank you for sending me the note from Dr. Adamantiadis. I wish to thank him for calling attention to the similarity of my case with the congenital anomaly known as epitarsus. This case, I believe, differs slightly from epitarsus in that the connecting band ran in a broad insertion from the lower tarsal border deep into the fornix.

(Signed) M. Wallace Friedman,
San Francisco, California.

CINCH OPERATION

Editor
American Journal of Ophthalmology:

My last paper on my cinch operation appeared in the 1930 *Transactions* of the Pacific Coast Oto-Ophthalmological Society (25 years ago). Since then I have made a number of changes in the technique and handling of operative cases. Anyone interested to know what these changes are should communicate with me and I shall be glad to supply the detailed information.

(Signed) Roderic O'Connor,
411-30th Street,
Oakland 9, California.

BOOK REVIEWS

MODERN TRENDS IN OPHTHALMOLOGY. Edited by Arnold Sorsby. New York, Paul B. Hoeber, Inc., 1955, third series. Clothbound, 346 pages, 111 illustrations, three color plates. Price: $12.50.

This is the third volume devoted to ophthalmology in the Modern Trend Series. Edited again by Arnold Sorsby, and with the co-operation of 50 American and European authors, this volume includes most of the important developments that have taken place since the publication of the second volume in 1947. After taking one glance at the table of contents, one cannot resist the temptation to read the book from cover to cover.

There are six sections: Anatomy, physiology, and optics; diagnostic procedures; clinical and experimental pathology; clinical aspects; treatment; and social aspects. These six sections are composed of 28 monographs. In most chapters the authors make no attempt to cover the subject under discussion completely but rather they give an over-all outline. For the reader interested in a particular topic, a selected bibliography is appended to each chapter.

Repetitions cannot be avoided in material of overlapping nature written by different authors. However, their occasional difference of opinion is often thought provoking. The advantage is that each chapter is a complete unit in itself, and one need not refer to a different section if interested in a particular topic.

J. François, M. Rabaey, and G. Vandermeerssche give a welcome introduction to phase-contrast and electron microscopy.

Ernst H. Bàràny considers the mathematical aspects regarding the measurements of aqueous flow. He makes some highly stimulating suggestions on unsolved problems; for instance, the use of a number of test substances for a multipoint method.

Hermann M. Burian and Paul Boeder, in their chapter on newer aspects of binocular vision, give a lucid introduction to Luneberg's theory of binocular visual space, a topic that is rather difficult for most ophthalmologists to comprehend.

Gunnar von Bahr authoritatively presents aspects on spheric and chromatic aberration.

Harold F. Falls describes in great detail problems of heredity that should enable anyone to prepare a pedigree of case reports for publication.

Milton L. Berliner's contribution on slit-lamp microscopy of the posterior segment of the eye should be singled out as one of the oustanding chapters. Except for the ophthalmologist who is able to read Hruby's German monograph, this is the most comprehensive presentation in the English literature of a method that undoubtedly is one of

the most important newer means of diagnostic investigation.

Irving H. Leopold gives a painstaking and comprehensive review of current aspects of ocular pharmacology.

Manuel L. Stillerman, in his discussion of diffuse collagen diseases, interestingly enough includes not only thromboangiitis obliterans but also erythema multiforme and Reiter's disease under the same general heading.

P. J. Waardenburg reports a family tree of a new polymorphic syndrome. It seems to be related to the one described by van der Hoeve. In addition to the markedly increased distance between the inner angles of the eyelids and the inferior lacrimal puncta, he observed a hyperplastic, broad nasal root, medial hyperplasia of the eyebrows, heterochromia iridum, congenital deafness, and a white forelock.

Sorsby reports a family with generalized fundus dystrophy. The onset is around the age of 40 years. At first there are hemorrhages and exudates of the central area. Over the course of years, a choroidal sclerosis extends peripherally. The end-stage is a widespread disappearance of the choroidal vessels. This picture must be differentiated from macular dystrophy of the Staargardt type, from angioid streaks, and from disciform degeneration of the macula.

There is an outstanding presentation of hypertensive retinopathy. R. A. Burn and K. J. Gurling discuss the general aspects of hypertensive disease and its surgical and medical management.

C. Dee Shapland describes his method of lamellar sclerectomy for retinal detachment in minute detail. He prefers it as a primary procedure in senile detachments with multiple peripheral tears and an atrophic retina, in detachments of myopia with multiple widely spaced rents in front of the equator, in detachments in aphakic eyes, in old inferior detachments with multiple retinal striae, and in detachments showing retraction of the vitreous.

H. Goldmann gives an interesting step-by-step description of his method of extracting nonmagnetic foreign bodies. It seems to be rather time consuming and requires close co-operation between surgeon and roentgenologist.

Mary Savory reports an extremely intriguing technique of irrigating the anterior chamber with thrombin before opening it. This procedure should prove to be a real advantage in instances in which massive hemorrhages can be anticipated.

It may have been highly unfair to have chosen these random selections when there were others equally timely and fascinating. However, these selections should whet the appetite of every ophthalmologist for getting acquainted with this volume. This is equally true for the resident who may find an answer to many puzzling problems not yet included in standard textbooks and for the seasoned practitioner who will find it an extremely pleasant means to bring himself up to date on the many new problems of the past decade.

Stefan Van Wien.

TWO LECTURES ON BIOMICROSCOPY OF THE EYE. By Prof. Hans Goldmann. Berne, Switzerland, Rösch, Vogt and Company. 55 pages, 63 figures, references. Price: Not listed.

Professor Goldmann of Berne is one of the world's most ingenious and scientific ophthalmologists whose work, particularly with glaucoma, is known by all ophthalmologists.

In this book he brings together two delightful lectures. The first is an introduction to gonioscopy, the second is on the examination of the vitreous and the fundus with the slitlamp. Since he is an expert on both of these subjects, the lectures are particularly significant. The illustrations are beautifully done and show the pertinent points most satisfactorily.

Gonioscopy is becoming almost routine office procedure but the examination of the vitreous and the fundus with the slitlamp,

while technically difficult to a certain extent, is not, as yet, as widely practiced as it will be in the future. More and more ophthalmologists are becoming familiar with the technique of this important phase in the examination of an eye, particularly since the work of Hruby and Goldmann has simplified the technique and explained the findings.

These lectures are required reading, particularly for the resident.

Derrick Vail.

Refraction and Body Growth. By G. S. Pendse, M.D. New Delhi, Indian Council of Medical Research. Memoir No. 38. 1955, 94 pages. Paper-bound.

This contribution stems from Poona, a city in southern India, and is concerned with an analysis of the refractive status under atropine cycloplegia of 1,182 unselected males and females, aged six to 18 years, derived in about equal numbers from two contrasting castes—the educated Brahmins and the so-called untouchables or hereditary servant class. The detailed statistical studies are presented in nine graphs and 29 tables. The maximum myopic change occurs at the advent of puberty which is about the age of 12 years in females and 14 years in males. While puberty factors are operative, acceleration of height is accompanied by acceleration of myopia. Though schooling among the servant class is practically nil, this group shows statistically a greater acceleration in myopia than the Brahmins. Before puberty nutritional deficiencies may affect the myopic tendency, since myopes below the age of 12 years are likely to have lower hemoglobin and serum calcium levels than normal children of the same age. Apart from the genetic factor, growth is influenced by hormones from the thyroid, pituitary, and sex glands which quite possibly affect the progress of myopia likewise.

James E. Lebensohn.

Sandoz Atlas of Haematology. Written and compiled by E. Undritz. English translation by A. M. Woolman. Basle, Switzerland, Sandoz, Ltd., 1952. Now available at cost ($7.00) as a service to the medical profession by Sandoz Pharmaceutical Company.

This atlas consists of 75 pages of descriptive material and 44 beautiful plates which, I am told, are highly accurate. There is a bibliography and an adequate index. Because ophthalmologists are primarily physicians, there is much in this book that should interest them and repay a careful study.

Derrick Vail.

BOOKS RECEIVED FOR REVIEW

The following books have been received for review. Acknowledgment is made here because often there is a delay until a suitable review appears.

A Textbook of Medicine. Edited by Russell L. Cecil, M.D. Associate Editors: Alexander B. Gutman, M.D., Walsh McDermott, M.D., and Harold G. Wolff, M.D. Philadelphia and London, W. B. Saunders Company, 1955. Price: $15.00.

Volume III. Annotated Bibliography of Vitamin E (1952-1954). Compiled by Philip L. Harris and Wilma Kujaeski. Distributed by The National Vitamin Foundation, Inc., 15 East 58th Street, New York 22, New York. Price: $3.00.

The Visual Fields (A Study of the Applications of Quantitative Perimetry to the Anatomy and Pathology of the Visual Pathways). By Brodie Hughes, M.B., F.R.C.S. (Eng.). Springfield, Illinois, Charles C Thomas, 1955. Price: $7.25.

Optomotor Reflexes and Nystagmus. By G. B. J. Keiner, M.D., and C. Otto Roelofs, M.D. The Hague, Martin Nijhoff. Price: Guilders 20.-

Ageing: General Aspects. By G. E. W. Wolstenholme, M.B., and Margaret P. Cameron, M.A. (Ciba Foundation Colloquia on Ageing.) Boston, Little, Brown and Company, 1955. Price: $6.75.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

2

GENERAL PATHOLOGY, BACTERIOLOGY, IMMUNOLOGY

Lavagna, M. F. **Biochemistry of the fish lens.** Bull. et mém. Soc. franç. d'opht. 57:45-51, 1954.

The purpose of this study of several hundred lenses of various species of fish was to gain additional knowledge on the biology of the accommodation mechanism in groups of animals in which accommodation is accomplished by displacement of the lens. The average water content of the lens was found to be 50 percent and was equal in Selachians and Teleostians. There was no difference in the water content of the center of the lens and the periphery, and this water content was about that of the lens nucleus in mammals. The lack of water and the resulting density of the fish lens, its spheric form and its unchangeable shape prevent any modification of curvature. (3 tables) Alice R. Deutsch.

Lepri, G., and Fornaro, L. **The effect of gamma globulin on experimental vaccinia and herpes infection of the cornea.** Arch. di ottal. **58**:327-332, Sept.-Oct., 1954.

Gamma globulin (2.5 cc.) given intramuscularly, when the de-epithelialized cornea was infected with vaccinia in four rabbits and with herpes simplex virus in four other rabbits, failed to modify the course of the infection from that in the control animals. One control animal infected with herpes virus died from encephalitis. None of the treated animals died. The authors think of the possibility of a protective action of gamma globulin. (3 references) John J. Stern.

Raymond, R. L. **Studies on infection in the rabbit's eye with special reference to drainage in intraocular infection.** M. J. Australia 1:563-568, April 16, 1955.

The following studies on infection in rabbit eyes were performed with the objects and results as follows. 1. To investigate whether hyaluronidase by its spreading effect would cause drugs to enter the aqueous more readily when injected close to the eyeball. The hyaluronidase did not increase the passage of hemoglobin or penicillin from beneath the conjunctiva or Tenon's capsule into the eye. 2. To investigate whether the hygroscopic effect of glycerine drops on the cornea would accelerate the passage of dyes from the subconjunctival space into the cornea. Glycerine had no such effect. 3. To in-

vestigate whether the hygroscopic effect of glycerine would promote the healing of corneal infections; it did not. 4. To investigate whether open drainage through the cornea was possible without destroying the eye. It was possible (a) by tantalum wire setons threaded through the periphery of the cornea and left for one week, and by (b) a trephine hole 2 millimetres in diameter through the cornea, not covered by any conjunctival flap. 5. To investigate whether such open drainage of the anterior chamber was of value in combating intraocular sepsis. The cure of experimentally induced intraocular infections was greatly assisted.

Ronald Lowe.

Suie, T., and Taylor, F. W. **Incidence of coagulase-positive staphylococci in external ocular infections.** A.M.A. Arch. Ophth. **53**:706-707, May, 1955.

Coagulase-positive staphylococci are more commonly present in eyes with conjunctivitis than coagulase-negative. (1 table, 7 references) G. S. Tyner.

Wilder, H. C., and Bickerton, J. H. **Organisms identified in inflammatory lesions of eyes in the Registry of Ophthalmic Pathology.** A.M.A. Arch. Ophth. **53**:575-584, April, 1955.

The scientific exhibit for the June, 1955, meeting of the A.M.A. is described. Intranuclear inclusion bodies resembling those of herpes simplex, Treponema pallidum, Mycobacterium tuberculosis, Mycobacterium leprae, Mucor, Candida, Toxoplasma, Cysticercus, and nematode larvae have been demonstrated in intraocular granulomatous lesions in the Registry of Ophthalmic Pathology at the Armed Forces Institute of Pathology, and examples of the lesions which they incite, with brief clinical histories and statistical data, are included in the exhibit. (39 figures) G. S. Tyner.

Witmer, Rudolf S. **Experimental leptospiral uveitis in rabbits.** A.M.A. Arch. Ophth. **53**:547-559, April, 1955.

Experimental studies on rabbits indicate that one introcular infection produces partial immunity. Determination of antibody activity in aqueous humor and serum is "a potentially useful tool for the etiologic diagnosis of uveitis." (10 figures, 5 tables, 16 references) G. S. Tyner.

3

VEGETATIVE PHYSIOLOGY, BIOCHEMISTRY, PHARMACOLOGY, TOXICOLOGY

Busacca, Archimède. **The physiology of the ciliary muscle, studied by gonioscopy.** Ann. d'ocul. **188**:1-21, Jan., 1955.

In a young iridectomized subject with normal lens, zonule and ciliary body, the instillation of eserine was seen by gonioscopy to provoke a swelling and forward displacement of the ciliary body with narrowing of the angle, while shrinking and backward displacement of the ciliary body with widening of the angle occurred after the use of atropine. In the light of these findings a theory is offered to explain how the circulation of aqueous humour is facilitated by eserine and impeded by atropine. (8 figures, 10 references)

John C. Locke.

Drance, S. M. **Quinine amaurosis.** Brit. J. Ophth. **39**:178-181, March, 1955.

A 20-year-old girl suddenly developed complete amaurosis, coma for an hour, and vomiting. She had no light perception, completely normal fundi, no other neurological abnormality and a palpable mass in the lower pelvis. She had ingested 0.5 oz. of quinine three hours before onset of symptoms to induce abortion. After about five weeks vision returned to normal except for some night blindness. The fundi had remained more or less normal, except for some arterial constriction 11 days after onset.

There is some question as to the explanation for the amaurosis in quinine poisoning which has become quite rare. It has been believed to be due to a toxic effect on the vessels causing a severe vasoconstriction but is more probably due to direct action of the poison upon the cells of the retina. (2 figures, 10 references)
Morris Kaplan.

François, J., Rabaey, M., and Wieme, R. J. **New method for fractionation of lens proteins.** A.M.A. Arch. Ophth. **53**: 481-486, April, 1955.

A method for determining the various protein fractions of the lens cortex and nucleus is described. These studies suggest that the lens contains very large molecules with a "tendency to agglomeration, of which the degree must be of great importance in the aging of the lens and cataract formation." (13 figures, 2 tables, 12 references) G. S. Tyner.

François, J., Rabaey, M., and Wieme, R. J. **A new technique in fractional division of the lens-protein.** Bull. et mém. Soc. franç. d'opht. **67**:26-36, 1954.

The separation of lens proteins had been studied in previous experiments but it is only with the present techniques, inspired by Cohn's work, that well defined and electrophoretically homogeneous fractions could be achieved. Cattle lenses were used. Because of the difference in the extracts of the soluble proteins in the nucleus and cortex a different method was used for each part.

The following simple fractions were found in the cortex; crystallin α lc, crystalline α 2c and crystallin β c; in the nucleus crystallin α n and crystallin β n. The crystallins are electrophoretically homogenous, the β crystallins arrange themselves electrophoretically on several levels. The existence of very large molecules which have the obvious tendency to aggregation was revealed. The amount of this aggregation might have a great importance in the aging of the lens and the etiology of cataracts. (12 references, 13 figures, 3 tables) Alice R. Deutsch.

Green, H., Bocher, C. A., Calnan, A. F., Leopold, I. H., and Rosenberg, A. P. **Carbonic anhydrase and the maintenance of intraocular tension.** A.M.A. Arch. Ophth. **53**:463-471, April, 1955.

The authors report a study of the relationship between carbonic anhydrase activity, bicarbonate ion secretion of the ciliary body and the influence of acetazoleamide on these activities. Using rabbits as experimental animals it was found that the intravenous and subconjunctival administration of acetazoleamide completely inhibited carbonic anhydrase activity of the ciliary body and iris. The intraocular tension of the normal eye was unaffected. The authors therefore conclude that the maintenance of the intraocular pressure of the normal rabbit eye is not dependent upon the carbonic anhydrase activity of the anterior uvea. (12 tables, 10 references) G. S. Tyner.

Green, H., Bocher, C. A., Leopold, I. H., Sawyer, J. L., Rosenberg, A. P. and Waters, L. P. **Carbonic anhydrase and the elaboration of bicarbonate ion in the rabbit eye.** A.M.A. Arch. Ophth. **53**:472-477, April, 1955.

Using rabbits as experimental animals it was determined that the intravenous and subconjunctival administration of acetazoleamide did not affect the secretion of bicarbonate ion into the anterior chamber. In view of a previous paper by the authors they conclude that the secretion of bicarbonate ion is not dependent upon carbonic anhydrase activity. (12 tables, 4 references) G. S. Tyner.

Green, H., Sawyer, J. L., Leopold, I. H. Bocher, C. A., and Rosenberg, A. P. **De-**

termination of acetaboleamide in aqueous humor of the rabbit eye. A.M.A. Arch. Ophth. **53**:478-480, April, 1955.

The authors describe a spectrophotometric method for determining the presence of acetazoleamide in the aqueous. Measurable amounts of the drug were found after intravenous and subconjunctival administration in the rabbit. (2 figures, 4 references) G. S. Tyner.

Kinsey, V. E., Camacho, E., Cavanaugh, G. A., Constant, M., and McGinty, D. A. **Dependence of IOP-lowering effect of acetazoleamide on salt.** A.M.A. Arch. Ophth. **53**:680-685, May, 1955.

In this study the authors attempt to explain the discrepancies found in different laboratories as to the effect of acetazoleamide on rabbits. The authors show that the tension-lowering action of the drug depends upon the salt intake of the animals several weeks before the experiment. Increased sodium intake apparently enhances the tension-lowering of acetazoleamide in rabbits. (4 tables, 4 references) G. S. Tyner.

Küchle, H. J. **The influence of surface anesthetics on the regeneration of corneal epithelium.** Klin. Monatsbl. f. Augenh. **126**:313-320, 1955.

A standard lesion was made in a rabbit cornea by steam cauterization. The lesion had a diameter of 6 mm. and the regeneration was observed with the help of fluoresceine. The staining area was calculated mathematically. Without any drops the lesion healed in 32 to 56 hours. It was found that pontocaine inhibited corneal regeneration more than psicaine and cornecaine. Least inhibitive was cocaine which even in a 10 percent solution did not influence the growth of epithelial cells. This surprising result is explained by the different effect of cocaine on carnivorous and herbivorous animals. (4 figures, 10 references) Frederick C. Blodi.

Rao, S. S., Kulkarni, M. E., Cooper, S. N., and Radhakrishnan, M. R. **Analysis of proteins of bovine lens, vitreous, and aqueous by electrophoresis and by Oudin's gel diffusion technique.** Brit. J. Ophth. **39**: 163-169, March, 1955.

As part of a study of endophthalmitis phacoanaphylactica the proteins present in bovine lens, aqueous and vitreous were dialysed and then concentrated by evaporation. These solutions were then injected into rabbits to produce antisera. The rabbit sera were analysed by electrophoresis with the Hilger apparatus. The lens was found to contain three proteins none of which seemed antigenically related to serum proteins. The aqueous contained six proteins, three of which were those of the lens and three were serum proteins. The vitreous contained seven proteins, five of which were serum proteins and two were lens proteins. Since the lens proteins differ antigenically from those of the blood serum and since the proteins in the lens, aqueous and vitreous are found to have proteins in common, this may shed some light on the problem of anaphylactic reactions of the injured lens, aqueous or vitreous. (7 figures, 1 table, 19 references) Morris Kaplan.

Smelser, G. K., and Chen, D. K. **Physiological changes in cornea induced by contact lenses.** A.M.A. Arch. Ophth. **53**:676-679, May, 1955.

After placing conventional contact lenses in guinea pigs the authors believe that these lenses interfere with the normal corneal metabolism. Wearing of the lenses results in accumulation of lactic acid in the cornea due to interference with the access of the corneal surface to oxygen. (1 figure, 1 table, 9 references) G. S. Tyner.

Yourish, N., Paton, B., Brodie, B. B., and Burns, J. J. **Effect of phenylbutazone (Butazolidin) on experimentally induced**

ocular inflammation. A.M.A. Arch. Ophth. **53**:264-266, Feb., 1955.

Phenylbutazone, when used systemically on the rabbit, is about as effective as cortisone in blocking the inflammation produced by injecting glycerine into the anterior chamber. (1 figure, 1 table, 10 references) G. S. Tyner.

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Aserinsky, Eugene. **Effects of illumination and sleep upon amplitude of electro-oculogram.** A.M.A. Arch. Ophth. **53**:542-546, April, 1955.

"The electro-oculogram is a record of eye movement based on the detection of the D.C. potential of the eyes and subsequent electronic magnification." Significant alteration in the amplitude of the EOG is produced by dark and light adaptation and sleep. (2 figures, 13 references) G. S. Tyner.

Askovitz, S. I., **A simple nomogram for problems in optics.** A.M.A. Arch. Ophth. **53**:702-705, May, 1955.

A simple monogram is presented for the graphic solution of numerical problems dealing with spherical lenses and mirrors. It should be of value to the student of optics to read the article. (7 figures, 3 references) G. S. Tyner.

Kuzin, S. F. **Heredity in the origin of myopia.** Vestnik oftalmologii **33**:20-25, 1954.

The author feels that heredity cannot be the only factor producing myopia. Influences of the other parts of the body on the eye during its development are of considerable importance. Outside conditions also are of great importance. Lighting and close work are the most frequent injurious factors cited by the author.

Sylvan Brandon.

Nordenson, J. W. **Remarks on biastigmatism.** Ann. d'ocul. **187**:1057-1060, Dec., 1954.

Biastigmatism refers to a condition of the eye which is thought by some to require correction by two obliquely crossed cylinders, rather than by a single cylindrical lens. One of the crossed cylinders is ground on the anterior surface of the lens, and the other on the posterior surface. On the basis of his experience with a number of cases the author is not able to convince himself of the superiority of a bicylindrical correction. (7 references)

John C. Locke.

Ogle, Kenneth N. **Stereopsis and vertical disparity.** A.M.A. Arch. Ophth. **53**:495-504, April, 1955.

Studies on human subjects indicate that despite large vertical disparities (up to 25 minutes of arc) between images seen by both eyes, stereopsis still exists. The experimental set-up for these tests is described. (8 figures, 19 references)

G. S. Tyner.

Welsman, H. S., and McCulloch, C. **The fields of vision and their significance when projected into space.** A.M.A. Arch. Ophth. **53**:694-699, May, 1955.

Tangent screen examinations were done with dark objects on a light background at distances of 2000 to 10,000 mm. The composite visual field when so tested resembles an elongated cone. The significance seems obscure. (3 figures, 3 tables, 3 references) G. S. Tyner.

5

DIAGNOSIS AND THERAPY

Alajmo, A. **Results of the ophthalmological application of a combination of cortisone and chloramphenicol.** Boll. d'ocul. **34**:3-6, Jan., 1955.

The author treated various forms of keratitis by the application of an ointment

consisting of chloramphenicol 1 percent and hydrocortisone 0.5 percent. The results which were obtained in all of the cases (a total of 32) were excellent. The duration of treatment which consisted essentially of the instillation of the ointment every three hours ranged from 3 to 20 days. (1 table)

William C. Caccamise.

Barraquer Moner, Joaquin. **Pharmacodynamic potentiation in ophthalmology.** Arch. d'opht. **15**:16-42, 1955.

The author stresses the importance of new anesthesia techniques in ocular surgery and reviews the advances dating from the introduction of akinesia by Van Lint and Villard and including the introduction into ocular surgery of curare by Kirby. He concludes that pharmacodynamic potentiation has two purposes: 1. the avoidance of neurovegetative and neurovascular disequilibrium, and 2. the obtaining of general and ocular tranquility from which the surgeon derives greater security than he does from the classical local akinesia. He states that general akinesia is more efficacious than local akinesia and that it eliminates the complications of orbital edema, infiltration, and venous stasis. The techniques are described in detail and their application to each type of ocular surgical procedure is outlined. (1 figure, 6 tables) Phillips Thygeson.

Contardo, René. **Artificial hibernation.** Arch. chil. de oftal. **11**:155-159, July-Dec., 1954.

In order to decrease the psychic trauma before ocular surgery the patient should be placed in a state of artificial hibernation, similar to the hibernation of animals, in which there is a decrease in cardiac and respiratory rhythm, basal metabolism, and activity of the cerebrum as shown by the electroencephalogram. Contardo achieves this state by using a combination of an analgesic (demerol), an antihistaminic (dihidral), and a hypnotic drug (sodium luminal). (15 references)

Walter Mayer.

Crone, R. A. **Clinical study of colour vision.** Brit. J. Ophth. **39**:170-173, March, 1955.

The Nagel anomaloscope is the only apparatus in general use for detecting defective color vision. The author gives directions for constructing and calibrating such an instrument with some changes to make it more universal. (2 figures, 2 references) Morris Kaplan.

De Luca, C., and Massimeo, A. **Anatomic-stratigraphic study of the orbital fissures.** Boll. d'ocul. **34**:75-86, Feb., 1955.

A 13-year-old boy developed an irreducible left exophthalmos of 24 mm. (Hertel) together with an inferolateral displacement of the eyeball. A clinical diagnosis of retrobulbar tumor was made, but X-ray examination of the skull and optic canals by the usual methods of projection failed to reveal any osseous change. However, by an original stratigraphic technique the authors localized a neoplastic growth to the medial wall of the left orbit. Surgical exploration revealed a spindle cell sarcoma and confirmed the stratigraphic findings. (6 figures, 1 table, 25 references)

William C. Caccamise.

Franke, J. **The conjunctival histamine reaction as a test for focal infections.** Klin. Monatsbl. f. Augenh. **126**:273-279, 1955.

The histamine reaction is positive if one drop of a 1:1000 solution causes conjunctival hyperemia and itching; 908 patients were tested. Among 268 healthy patients 38 percent had a positive test. Among patients with a focal infection in the region of the head and neck this percentage rose to 57.6 percent if no symp-

toms were present and to 67.8 percent if symptoms were present. The result of the test could change during the day and depended apparently on previous meals, caffeine, and other factors. A positive test is therefore absolutely inconclusive and the author warns against an overestimation of the histamine test. (2 figures, 6 references) Frederick C. Blodi.

Frith, M. L., and Wright, S. E. **Preservation of ophthalmic solutions. A critical evaluation.** Brit. J. Ophth. **39**:174-177, March, 1955.

Since the quaternary ammonium antiseptics will inhibit some organisms in very low concentrations it was decided to compare these with the "solution for eye-drops" of the British Pharmaceutical Codex which is a hydroxybenzoate. Accordingly cetrimide 1 to 20,000, the "solution for eye-drops," and distilled water were compared in action against staphylococcus aureus, Pseudomonas pyocyanea, Proteus vulgaris and Bacterium coli. No colonies of any of the bacteria grew in the cetrimide, and heavy growths appeared in the other two solutions. Cetrimide was found to be non-irritating to the eyes in this solution and was found to be quite compatible with most ophthalmic drugs. (2 tables, 9 references)

Morris Kaplan.

Gergovich, H. and Szantroch-Miszke, A. **Results of treatment of uveitis with hydrozide of isonicotinic acid.** Klinika oczna **24**:185-190, 1954.

The authors selected 41 patients with various ocular lesions in whom tuberculous etiology was suspected and treated them with hydrozide of isonicotinic acid. In old cases streptomycin and paraminosalicilic acid were used. In 16 cases of chorioretinitis improvement was noted and only one patient had a relapse after six months. All of 10 patients with uveitis improved under the same type of treatment. In 15 cases of iritis the results were similar. All patients were treated in the normal manner prior to the use of hydrozide, streptomicin and PAS. The average amount of hydrozide used was 8 to 10 grams and treatment lasted one and one half to three months. The addition of streptomycin and PAS appreciably shortened the time of treatment and made it more effective. No toxic reactions were noticed.

Sylvan Brandon.

Goodstein, S., Cinotti, A. A., Cholst, M., and Goeller, J. P. **A technique for goniophotography.** A.M.A. Arch. Ophth. **53**:649-650, May, 1955.

The authors use a hand illuminator and direct a beam of light through the gonioprism. This is done by an assistant. The operator manipulates the lens and camera. The camera diaphragm is left open until it is on target. The assistant closes the diaphragm and the operator trips the shutter setting off the synchronized flash bulb. An SM bulb is used at an aperture of 5.6. (3 figures) G. S. Tyner.

Hogan, M. J., Thygeson, P., and Kimura, S. **Uses and abuses of adrenal steroids and corticotropin.** A.M.A. Arch. Ophth. **53**:165-176, Feb., 1955.

This article, while containing little new information, serves to crystallize existing opinions on the use of these drugs in eye diseases. Peptic ulcer, diabetes, and tuberculosis are among the diseases listed by the authors which are contraindications to the systemic use of adrenal steroids and corticotropin. In the presence of acute infectious diseases, great caution must be observed in using these drugs because antibiotics may be rendered less effective. Systemic use of these drugs is usually reserved for disease of the posterior segment involving the area of the macula or disc. Unfavorable results were observed in retrobulbar neuritis, chronic iridocyclitis, some cases of chorioretinitis, orbital

pseudotumor and progressive exophthalmos.

In the treatment of most anterior segment disease, no significant difference was noted between the various cortisone and hydrocortisone preparations. Hydrocortisone may be superior to cortisone in the treatment of vernal conjunctivitis, sclerosing keratitis and contact dermatitis of the lids. Both cortisone and hydrocortisone are probably contraindicated in the treatment of dentritic ulcer. Their use may precipitate a severe disciform keratitis. (15 tables, 27 references) G. S. Tyner.

Jayle, G. E., Croisy, A., Franchini, N., Leroux, J., and Sauvan, J. **Perimetry in ophthalmic practice. An analysis of 1680 observations.** Arch. d'opht. **15**:138-163, 1955.

The authors distinguish between experimental and clinical perimetry. In the former the visual field is explored with meticulous care with targets of varied diameters, but in the latter the exploration is necessarily limited in extent. They analyze a number of techniques and then proceed to detail their experiences in connection with various eye diseases. They conclude that if visual fields are to be of value they should be taken only with proper apparatus and by methods of tested reliability. They stress the frequency of peripheral enlargement of the blind spot in high myopia, in glaucoma, in edema of the disc, and, more rarely, in tobacco-alcohol amblyopia and certain post-traumatic syndromes. (52 figures)
Phillips Thygeson.

Klemens, F., and Lüders, C. J. **Differential diagnosis of ocular tertiary lues.** Klin. Montsbl. f. Augenh. **126**:279-292, 1955.

Two cases are described, one in a 43-year-old man with a tuberous syphilid of the left upper lid and the other in a 59-year-old woman with a gumma of the orbit. Both presented diagnostic problems and even the histologic examination of the specimens did not reveal the true nature of the lesions until special staining methods were applied or until the serologic reactions gave the correct diagnosis. In the differential diagnosis tuberculosis and other granulomatous infections, especially pseudotumors of the orbit, are discussed. The following changes speak for syphilis: the presence of the treponema, the occlusion of the vessels with preservation of the elastic fibers, the preservation of the organ-structure in the necrotic areas, and new-formed reticulum fibers. The correct diagnosis is important because the appropriate treatment soon leads to a cure. (9 figures, 17 references)
Frederick C. Blodi.

Landau, J., and Bromberg, Y. M. **Impaired scotopic vision in adiposo-genital dystrophy.** Brit. J. Ophth. **39**:155-159, March, 1955.

Nineteen patients with adiposo-genital dystrophy and six obese but otherwise normal people were similarly studied. In all the dystrophic subjects dark adaptation was found to be impaired and in all the others it was found to be normal. It is suggested that the finding of impaired dark adaptation may be of diagnostic value in differentiating adiposo-genital dystrophy from other forms of obesity. (1 table, 15 references) Morris Kaplan.

Madroszkiewicz, Marcin. **Improved radiological method of localization of intraocular foreign bodies.** Klinika Oczna **24**:201-206, 1954.

Small metal indicators are put under the conjunctiva, on the sclera, next to the limbus. Schematic transparencies of the eye enlarged to 1.1 times the normal eye are placed on the X-ray picture and the exact position and size of the foreign body can be seen. A millimetric grid enlarged similarly serves to measure the distance

from the limbus or the center of the eye. (12 figures, 9 references)

Sylvan Brandon.

McDonald, J. E., Hughes, W. F., Jr., and Peiffer, V. G. **Beta radiation cataracts.** A.M.A. Arch. Ophth. **53**:248-259, Feb., 1955.

Rabbit lenses are about four times as sensitive as human lenses to this type of radiation. The lens tolerates about 10 times the beta dose when it is applied to the center of the cornea as when it is applied to the limbus. A "safe" or noncataractogenic dose in man may be 2000 rep over the limbus or 20,000 rep over the central corneal area. With a radon applicator 1 gm. sec. over the limbus or 10 gm. sec. over the central cornea may be used. (12 figures, 3 tables, 6 references)

G. S. Tyner.

Merriam, George R., Jr. **Late effects of beta radiation on the eye.** A.M.A. Arch. Ophth. **53**:708-717, May, 1955.

In this article caution in the application of beta irradiation to the eyes is urged. Late effects found by the author are telangiectasis and keratinization of the conjunctiva, scleral atrophy, superficial punctate keratitis, corneal vascularization and opacity, iritis, iris atrophy and cataract. These complications occurred after doses varying from 11,000 to 33,000 rep on the surface. (13 figures, 2 tables, 23 references)

G. S. Tyner.

Moskvina, V. S. **Examination of aqueous by drop method in intraocular copper foreign bodies.** Vestnik oftalmologii **33**:16-20, 1954.

The author conducted experiments in order to find an effective method of recognizing the presence of an intraocular copper foreign body by examining the aqueous. Particles of copper weighing about 100 mg. were introduced into the eyes of 34 rabbits. The aqueous was withdrawn with a needle from the eye containing the foreign body. Control examination of the aqueous of the other eye was also done, and the reagent was checked with distilled water. Various methods were used and only one proved to be sensitive enough. The reagent contained trivalent iron, a potassium salt and hyposulfite. The reaction was positive in all 64 tests. Tests on intraocular brass were done on eight rabbits with the same reagent, with the same positive results. The ions of copper could be discovered in the aqueous 48 hours after the introduction of the foreign body.

Sylvan Brandon.

Niedermeier, Siegfried. **Local cortisone and hydrocortisone therapy.** Klin. Monatsbl. f. Augenh. **126**:337-339, 1955.

Hydrocortisone is usually more effective than cortisone. It can be used in corneal ulcers if it is combined with an antibiotic. It inhibits fibroplastic wound healing and should not be used during the first 48 hours after an operation. (1 figure, 2 references) Frederick C. Blodi.

Nisbet, Alfred A. **Fixation forceps.** A.M.A. Arch. Ophth. **53**:720, May, 1955.

A 90° curved forceps with serrated jaws on the outside of the curve is illustrated for use in fixation during ocular surgery. (1 figure) G. S. Tyner.

Passmore, J. W., and King, J. H., Jr. **Vital staining of conjunctiva and cornea.** A.M.A. Arch. Ophth. **53**:568-574, April, 1955.

Studies on several dyes used for staining of surface defects in ophthalmologic practice indicate that fluorescein is still the most generally useful. Rose bengal is more valuable in diagnosing early cases of keratoconjunctivitis sicca. Any staining agent unused two weeks after the seal is broken should be discarded. The addition of polymyxin B to the solution may be

indicated to protect against contamination. The authors successfully used 1:5000 methiolate as a sterilizing agent. (19 references) G. S. Tyner.

Prince, J. H., Cowan, J. D., Jr., and Smith, N. A. **Further development in retinal photography.** A.M.A. Arch. Ophth. **53**:267-270, Feb., 1955.

Experiences in building a suitable power unit for the xenon lamp are described. By use of the new system the operator can determine before the film is developed whether the exposure has been proper. A rather complete description of the apparatus is contained in the article. (4 figures, 2 references) G. S. Tyner.

Purtscher, Ernest. **A shadow-line on the corneal surface.** Klin. Monatsbl. f. Augenh. **126**:339-340, 1955.

In catarrhal conjunctivitis the deeper layers of the precorneal film are thickened. If in such a case the cornea is transilluminated a slightly curved line can be seen that runs nearly horizontally from limbus to limbus. It is a mucous line which corresponds to the margin of the upper lid when the eye is open. A similar line could be observed in eyes with ptosis even without a conjunctivitis.

Frederick C. Blodi.

Quintieri, C. **The action of polymyxin and of streptomycin in ocular infections due to pyocyaneus.** Boll. d'ocul. **34**:7-16, Jan., 1955.

The therapeutic problem of ocular infections due to gram-negative bacilli has not yet found a completely satisfactory solution, notwithstanding the discovery first of the sulfonamides and subsequently of the antibiotics. The author presents a brief case history of a pyocyaneous infection which developed after extracapsular cataract surgery. In spite of treatment with penicillin, streptomycin, sulfathiazole, aureomycin, atropine and intramuscular milk injections the patient was discharged with a degenerating eye on the 36th day after the original cataract surgery.

Stimulated by this case the author subsequently induced corneal infection with pyocyaneus in rabbits and evaluated the effects of polymyxin and streptomycin. The laboratory results were considered to be favorable, especially when the drugs were used early in the course of the infection. Polymyxin may be considered at present to be the antibiotic of choice in the treatment of ocular infections due to B. pyocyaneus. Treatment is most effective when the infection is limited to the cornea and has not yet reached the intraocular tissues. (1 figure, 14 references)

William C. Caccamise.

Richter, Gerhard. **The problem of sterilizing ophthalmic solutions.** Klin. Monatsbl. f. Augenh. **126**:292-313, 1955.

Intraocular infections could recently be traced to the presence of microorganisms in the solutions which were used therapeutically. There are no laws or regulations in Germany concerning the sterility of ophthalmic solutions and a code is suggested. Heat-stable solutions should be autoclaved and heat-labile solutions should be prepared in an absolutely sterile manner. Zephiran should be added. All utensils, bottles and plastic covers should be autoclaved. No solution should be kept longer than four weeks. Individual plastic droppers (King) are preferred. (2 tables, 93 references)

Frederick C. Blodi.

Roslavtzev, A. V. **Examination of vision when lowered to light perception.** Vestnik oftalmologii **33**:42-44, 1954.

The author considers the usual method of determination of light projection and color perception in cataract patients unsatisfactory. To make it more precise he devised an instrument similar to a perim-

eter with a light source moving along the arc. Rheostat, color filters and openings of various size for the light are provided. The technique is similar to taking of a visual field. Sylvan Brandon.

Scheie, H. G., Ellis, R. A., Eckenhoff, J. E., and Spencer, R. W. **Long-lasting local anesthetic agents in ophthalmic surgery.** A.M.A. Arch. Ophth. **53**:177-190, Feb., 1955.

The use of long-lasting local anesthetic agents (8 to 10 hours) eliminates many of the undesirable postoperative difficulties following intraocular surgery, such as pain, blepharospasm, the side effects of the opiates, reflex vomiting and nausea.

As a preliminary study, various local anesthetic agents were compared when used as retrobulbar blocking agents on experimental animals. Efocaine was discarded because of systemic toxicity and local reaction. U-0045 (methoxyphenamine) was effective for about five hours as compared to about one hour for procaine and xylocaine. Hyaluronidase, while shortening the anesthetic period slightly, seemed a valuable adjunct because successful blocks were more easily obtained because of its diffusing properties. Various drugs were also tried topically, subconjunctivally, intracorneally and in the anterior chamber.

Efocaine was considered unsafe for clinical use because of its irritative qualities. U-0045 alone was found inadequate for good akinesia of the extraocular muscles and was therefore used in combination with procaine and hyaluronidase for clinical evaluation. A combination of 0.75 cc. U-0045 and 0.75 cc. of 10 percent procaine with hyaluronidase was used in 520 ocular surgical procedures. The patients remained pain free from eight to ten hours postoperatively. Subsequent pain was mild and controlled with aspirin. Tetracaine (pontocaine) in small amounts proved to be a safe agent for retrobulbar block and gave significantly longer anesthesia than procaine or lidocaine (xylocaine). (4 figures, 4 tables, 43 references) G. S. Tyner.

Verdaguer, J., and Rojas, W. **Modern application of iontophoresis.** Arch. chil. de oftal. **11**:149-154, July-Dec., 1954.

The authors urge the use of iontophoresis for treating eye diseases, give the history of the method and describe the cases treated by them. They tabulate such data as the pole which is to be placed in contact with the eye when using various common drugs, the concentrations which are to be used, the intensity of the current, and the duration of the application. (2 figures, 10 references) Walter Mayer.

6

OCULAR MOTILITY

Focosi, M., and Toselli, C. **The strabismus of Hertwig-Magendie.** Boll. d'ocul. **34**:87-97, Feb., 1955.

The literature concerning vertical divergence of the Hertwig-Magendie type is thoroughly reviewed and the author describes a case of his own. This form of strabismus is characterized by a deviation of one eye down and in and up and out of the other eye. The author suggests a clinical classification which includes latent, concomitant, and paralytic forms. (2 figures, 23 references) William C. Caccamise.

Hugonnier, R. **Surgical treatment of diplopias.** Bull. et mém. Soc. franç. d' opht. **67**:164-186, 1954.

There is nothing mysterious about the surgical treatment of diplopia as long as sound physiological principles are followed, proper timing observed, and the diplopia has been stabilized. The results obtained are not only dependent on the amount of simultaneous surgery performed but depend very much on the

individual patient and the individual surgeon; therefore no strict rules on the amount of resections, recessions or transplantations of muscles can be given. It also is advantageous not to do too much correction at one time and several interventions are to be preferred. The achievement of orthophoria in the inferior field is absolutely essential for the patient's comfort. The results are in general satisfactory except in isolated cases of cyclophoria and severe traumatic lesions of the orbit. The evaluating test of choice in pre- and post-surgical examinations is the Hess-Lancaster screen because with no other technique is the under-action and over-action of each single muscle made as clear. Nine detailed case histories with discussions on the indications for surgery and the reasons for the individual success or failures are included. (8 figures) Alice R. Deutsch.

Manzitti, E., and Ciancia, A. O. **Ocular torticollis.** Arch. oftal. Buenos Aires **29**:525-531, Oct., 1954.

After Nagel's classical paper on the occurrence of parallel, rotary movements of the eyes of vestibular origin on tilting the head to one side, the pathogenesis of the torticollis encountered in cases of trochlear paralysis seemed to be thoroughly understood (cf. Hoffmann, F. B., and Bielschowsky, A., Arch. f. Ophth. 51:174, 1900). Yet, facts which would not fit well into the accepted schema were soon to be noticed. Such are 1. the presence of torticollis in cases of unilateral (7:362, 1934) or bilateral superior oblique insufficiency where binocular vision is absent and the compensatory head tilting thereupon ineffectual; 2. the development of a complicating overaction of the ipsilateral superior rectus of a labyrinthine character; 3. the circumstance that, the vertical imbalance being often less due to the original superior oblique palsy than to a persisting inferior oblique contracture, the position of the head is not rarely opposite to that which should be expected theoretically.

In the same line of thought, a new, most interesting phenomenon is described by the authors as observed in ten cases of trochlear paralysis with torticollis, irrespective of whether binocular vision was present and of whether fixation was maintained with one eye or the other. Occlusion of the affected eye invariably caused the head tilt to vanish, while occlusion of the sound eye had no such an effect. (3 figures, 6 references)

A. Urrets-Zavalia, Jr.

Nutt, A. B. **Significance and surgical treatment of congenital ocular palsies.** Roy. Coll. Surg. Ann. **16**:30-59, Jan., 1955.

In this Hunterian Lecture the author deals with lesions of the peripheral muscular apparatus and the orbital fascia. It is his opinion that in the majority of the so-called congenital ocular palsies the defective movement results from mechanical interference with the normal rotation of the eyeball. As a result emphasis is placed on the importance of peripheral structural anomalies, especially of the orbital fascia, in the etiology of defective ocular movements manifest at, or soon after, birth. Several case histories illustrate some of the clinical problems involved, and the author's approach to their solution. (16 figures, 16 references)

William C. Caccamise.

Villaseca, Alfredo. **Surgical classification of squints with a vertical deviation.** Brit. J. Ophth. **39**:129-150, March, 1955.

Vertical deviations, either alone or in combination with horizontal deviations, are much more common than is generally believed. Several authors state that they occur in one half of all cases of horizontal strabismus. The superior rectus is most frequently the paretic muscle and the superior oblique, inferior rectus and the

two depressors together are next in order of frequency. Villaseca classifies the various types of deviations and their combinations and presents one or more case reports of each type. His classification follows. A. Primary vertical strabismus (with or without horizontal deviation) of which there are six types: 1. paresis of an elevator or depressor muscle of one eye; 2. paresis of both elevators or depressors of one eye; 3. bilateral paresis (or spasm) of twin muscles; 4. mixed or multiple paresis; 5. concomitant hypertropias; and 6. dissociated vertical divergence. B. Secondary vertical strabismus of which there are four types: 1. esotropia with bilateral elevation in adduction; 2. esotropia with bilateral depressions in adduction; 3. exotropia with bilateral elevation in adduction; and 4. exotropia with bilateral depression in adduction. C. Mixed cases. Cases of mixed primary vertical squint are rare. A period of dissociation by occlusion is always necessary before a final classification is made. (23 figures, 16 references) Morris Kaplan.

7

CONJUNCTIVA, CORNEA, SCLERA

Alimuddin, M. **Vernal conjunctivitis.** Brit. J. Ophth. **39**:160-162, March, 1955.

Observations on 1,871 cases of vernal conjunctivitis seen in three years in the Punjab are briefly described. The disease is very common there and is most common in patients 10 to 20 years of age. It occurs in males about four times as frequently as in females and is frequently associated with other diseases of allergic origin. (1 figure, 3 tables, 2 references) Morris Kaplan.

Andreani, D. **Observation of a case of delayed epithelialization of the anterior chamber.** Arch. di ottal. **58**:333-441, Sept.-Oct., 1954.

In a woman, aged 74 years, epithelial downgrowth was observed four years after a successful cataract extraction with a resulting cystoid corneal scar. X-ray therapy was administered (150 r six times at three-day intervals; 2 ma, 0.5 mm. zinc and 3 mm. aluminum filter, focal distance 33 cm.) This was repeated after 40 days. The treatment succeeded in arrresting the process and improved the vision from 1/50 to 7/10. (16 references) John J. Stern.

Boase, A. J. **Mooren ulcer in a corneal graft.** Brit. J. Ophth. **39**:182-183, March, 1955.

A 35-year-old male native of Congo presented himself with completely opaque corneas and vague light perception. Despite objections of the physician he begged for remedial surgery. A 10 mm. full-thickness graft was placed and the iris and lens were found to be surprisingly normal. The graft healed rapidly and when the sutures were removed it was quite clear. The day after removal of the sutures, the edge of the graft developed a deep ulcer which rapidly spread over the whole graft and the rest of the cornea as well. The ulcer became quite severe involving all layers of the cornea and just when perforation seemed likely to result, the patient disappeared. This was apparently a typical Mooren ulcer which is quite rare in a corneal graft.

Morris Kaplan.

Chrzanowzka-Srzednicka, Krystyna. **Results of treatment of keratoscleritis with hydrozide of isonicotinic acid.** Klinika Oczna **24**:191-194, 1954.

Seventeen patients with scleritis in all of whom Mantoux tests were positive and other objective signs suggested tuberculosis, were treated with hydrozide of isonicotinic acid. Hydrozide was used in 0.05 doses three times a day. The average total amount was about 8 to 9 grams. Streptomycin and PAS were also used. Usually improvement was noticed in two to four

weeks and treatment was usually continued for about two months. Two patients had recurrences which were checked by hydrozide treatment.

Sylvan Brandon.

Escapini, Humberto. **Nerve changes in the human corneal graft.** A.M.A. Arch. Ophth. **53**:229-235, Feb., 1955.

The palpebral reflex is present in human eyes with corneal grafts after about 12 months. After several years the entire corneal sensitivity is normal. New nerves invade the graft independently of neovascularization or clarity. Nerve supply has little to do with clarity, but is probably important in trophic and nutritional balance. (12 figures, 12 references)

G. S. Tyner.

Franceschetti, A., and Maeder, G. **Parenchymatous (deep) corneal dystrophy in congenital ichthyosis.** Bull. et mém. Soc. franç. d'opht. **67**:146-150, 1954.

The case history of a young man with congenital ichthyosis is reviewed. With the slitlamp very fine bluish and translucent filaments were visible just in front of Descemet's membrane. Otherwise both eyes were normal and vision was unimpaired. The clinical picture did not coincide with that of the other two known deep parenchymatous groups of dystrophies, namely cornea farinata (Vogt, 1923) and dystrophia filiformis profunda (Maeder et Danis). Neither did it resemble any of the three forms of corneal disease in ichthyosis as described by Cordes and Hogan in 1939. It might be a hitherto undescribed dystrophy or a sign of ichthyosis. (6 references, 1 figure)

Alice R. Deutsch.

Fridman, S. J. **Perilimbal novocain block in treatment of keratitis.** Vestnik oftalmologii **33**:25-30, 1954.

The author discusses the theoretical basis for the use of novocain block in herpetic keratitis. Injection in various parts of the body for stimulation is described, but pericorneal injection is preferred. Usual medication with atropine, albucid and patching is maintained. Subjective improvement and rapid epithelization of the cornea were noted. This treatment was applied in 30 patients. Of 21 patients with superficial keratitis 18, and of 5 with deep keratitis, 4 were definitely improved. Corneal ulcers were not visibly affected by the novocain block. The author concludes that this treatment speeded epithelization, decreased the time of treatment and decreased the loss of vision due to scarring. In some cases novocain block had to be repeated to obtain complete healing. Two cases are presented in detail for illustration.

Sylvan Brandon.

Gundersen, Trygve. **Cornea and sclera.** A.M.A. Arch. Ophth. **53**:271-300, Feb., 1955.

The year's literature is abstracted and reviewed. (306 references) G. S. Tyner.

Guzzinati, G. C., and Capalbi, S. **Two cases of primary epithelioma of the cornea.** Ann. di ottal. e clin. ocul. **81**:113-124, March, 1955.

Two cases of epithelioma of the cornea (one a spinocellular carcinoma, the other a basocellular one) are described and illustrated (7 photomicrograms). The authors conclude from their study of the literature and of their own cases that: 1. primary epithelioma of the cornea originates more frequently in tissue which has undergone inflammatory or traumatic lesions; 2. this type of tumor tends to develop superficially without invading the eyeball; 3. the histologic picture is typical and the histopathologic diagnosis is easy; the aspect and the clinical course do not allow a precise diagnosis; and 4. surgery is the only therapy. It must be performed early and excission must be followed by

adequate cauterization. X-ray therapy is not indicated unless the tumor infiltrates deep tissues. (10 figures, 50 references)

John J. Stern.

Hervouet, F., Stankovic, Y., and Blagojevic, M. **New observations on the transplantation of sclera into the cornea of the rabbit.** Arch. d'opht. **15**:43-57, 1955.

The authors studied the fate of scleral implants in the cornea and conclude that the scleral tissue is dissolved and replaced by new corneal tissue. They offer histological and microchemical evidence to substantiate this conclusion. They discuss in some detail the phenomenon of corneal transparency as opposed to scleral opacity and note that there are differences between corneal and scleral mucoids as evidenced by their reactions to toluidine blue. They report the regeneration of epithelium in the graft but note the absence of any tendency for Descemet's membrane to form although a thin layer of endothelium is demonstrable.

Phillips Thygeson.

Junker, H. **The treatment of epidemic keratoconjunctivitis with acetylcholine.** Klin. Monatsbl. f. Augenh. **126**:336-337, 1955.

Acetylcholine ointment seemed to be an excellent treatment of EKC. It was used alone or in combination with an antibiotic. Its further usefulness should be investigated. Frederick C. Blodi.

Kropman, J. L. **Treatment of diseases of the cornea with vitamins A and B1.** Vestnik oftalmologii **33**:30-34, 1954.

Various forms of keratitis are influenced by the condition of the nerves. Vitamin A and B1, in cases of their deficiency, act synergetically by affecting the peripheral nerves and help to cure diseases of the cornea. The usual local treatment was used but addition of vitamins rapidly brought on improvement in 14 cases of herpetic keratitis and eight cases of trachomatous corneal ulcer. Rodent ulcer or scrofulous keratitis were not affected. The author concludes that vitamins A and B1, by stimulating the trophic activity of nerves, help the process of healing.

Sylvan Brandon.

McNair, J. N., and King, J. H., Jr. **Preservation of cornea by dehydration.** A.M.A. Arch. Ophth. **53**:519-521, April, 1955.

The entire cornea was removed from cats' eyes, preserved by the glycerine-saline technique with freezing and dried in a vacuum by removing water from the glycerine solution. By this method, donor grafts can be stored indefinitely and yield clear, non-perforating lamellar grafts. (3 figures, 1 table, 6 references)

G. S. Tyner.

Pagano, M. **Photosensitization due to sulfonamide in a case of vernal conjunctivitis.** Boll. d'ocul. **34**:117-123, Feb., 1955.

A 16-year-old patient who had been studied periodically because of vernal conjunctivitis developed severe photophobia and conjunctival itching together with a skin reaction after the ingestion of a sulfonamide preparation for furunculosis. The author believes that this case supports the theory that photosensitization of the conjunctiva together with an alteration in porphyrin metabolism plays a role in the etiology of vernal conjunctivitis. (21 references) William C. Caccamise.

Paula Santos, B., and Mendonca Uchoa, P. P. **Antitrachomatous prophylaxis in the state of S. Paulo (Brazil).** Rev. brasil. oftal. **14**:49-56, March, 1955.

This paper shows by aid of graphic charts how the incidence of trachoma has decreased considerably in São Pãulo, since the discovery of sulfa drugs and antibiotics. (3 graphic charts) Walter Mayer.

Rocha, H., and Soares, R. **Pseudomembranous conjunctivitis plastica lignosa.** Rev. brasil. oftal. **14**:17-36, March, 1955.

The authors give an extensive historic review of this special type of pseudomembranous conjunctivitis and then report the clinical history of their patient, who was improved considerably after two series of beta radiation with previous mechanical removal of the pseudomembranes. The pathologic study of the membranes revealed fibrinous inflammation. The authors discuss the possible etiology of this disease, which is still unknown. Most authors think it probable that a virus is the cause. (1 figure) Walter Mayer.

Stocker, F. W., and Holt, L. B. **Rare form of hereditary epithelial dystrophy of the cornea.** A.M.A. Arch. Ophth. **53**:536-541, April, 1955.

The clinical appearance of the disease is described. Diffuse slitlamp illumination shows corneal haze due to superficial fine grayish punctate staining opacities. The entire corneal surface is involved. The process is limited to the epithelium. 20 cases are reported in subject all of whom had a common Moravian ancestor. The disease is dominant. (7 figures, 18 references) G. S. Tyner.

Wilczek, Marian. **Treatment of trachoma with medicines.** Klinika Oczna **24**:195-199, 1954.

Since 1945 penicillin (5,000 units per gm.), sulfathiazole powder and sulfathiazole ointment, 10-percent aureomycin and 2-percent chloromycetin ointment were used in a few thousand cases of acute trachoma. The author feels that all these drugs are of great help in the treatment of trachoma and that they act on the virus itself and not on the secondary invaders. Investigation of the conjunctival flora in 400 patients frequently showed no organisms. It was also found that numerically the saprophytes and virulent bacteria were unchanged after the course of treatment with antibiotics. In trachoma chloromycetin and aureomycin were the most effective, treatment lasting from three to five months. It lasted from five to seven months when sulfathiazole was used. About 50 to 70 percent of patients in the hospital were cured within three to four months. A smaller group recovered in six to seven months. The author feels that the treatment may be more effective when, after two to three months of using one drug, another one is substituted. (1 table) Sylvan Brandon.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Erdbrink, W. L., and Harbert, F. **Leiomyoma of the iris.** A.M.A. Arch. Ophth. **53**:643-648, May, 1955.

This is the first reported case of this tumor subjected to radioactive phosphorus uptake studies prior to removal. Clinically this tumor is elevated, nodular, lightly colored, well circumscribed and usually confined to the lower quadrant of the iris. It occurs in middle aged Caucasians, is of long duration and asymptomatic. Phosphorus uptake studies are negative which helps to differentiate it from melanomas. Total excision by iridectomy is recommended. (4 figures, 2 tables, 30 references) G. S. Tyner.

François, J., and Beheyt, J. **Bilateral Fuchs' heterochromia.** Ann. d'ocul. **188**:55-63, Jan., 1955.

The authors present four cases of bilateral heterochromia of Fuchs. Diagnosis is more easily missed than in the unilateral form, because of the absence of iris heterochromia. It should be suspected in any bilateral uveitis with iris hypochromia, but without posterior synechiae

or acute inflammatory phenomena. No gross anomalies of the angle are seen on gonioscopy, but radially directed vascular loops are occasionally observed. Aqueous humour analysis shows albumen, but no inflammatory cells. A small filiform hemorrhage appearing in the angle after anterior chamber puncture is pathognomonic. The degree of pupillary dilatation following instillation of 1 percent benzedrine solution is less than normal. (14 references) John C. Locke.

François, J., and Haustrate, L. **Ocular manifestations of Still's disease.** Ann. d'ocul. **187**:1061-1080, Dec., 1954.

A case of bilateral low-grade iridocyclitis, band keratopathy, and complicated cataract in a two-year-old boy is presented. The authors believe that this triad is pathognomonic of rheumatism in children, even in the absence of clear-cut articular lesions. (1 figure, 89 references) John C. Locke.

Holmberg, Ake. **The local treatment of acute iridocyclitis with cortisone.** Acta opht. **31**:75-89, 1953.

To assess the value of cortisone in the therapy of acute iridocyclitis the records of 73 patients were analyzed. Of these 23 formed a control group treated with conventional agents; 23 received in addition cortisone ointment two to three times daily, and 29 cortisone drops instead of the ointment. The healing time averaged 22 days for the control group, 18 days for the group treated with cortisone ointment, and 12 days for the group treated with cortisone drops. The frequency of relapse was greater in the cases treated with cortisone. The author concludes that the value of cortisone is overrated. It shortens the course of the disease in some cases, the drops being more effective than the ointment. It has no effect on synechia, but lessens the tendency toward their development. It controls subjective symptoms. (4 tables, 34 references) Ray K. Daily.

Pacyńska, Julia. **Results of treatment of inflammatory conditions of the eye with hydrolizate of ACTH and typhoid vaccine.** Klinika Oczna **24**:179-184, 1954.

Hydrolizate of ACTH was found to be much stronger in action than ACTH. Only 0.5 to 1 mg. doses were used. In 10 of 20 cases an iritis healed in 10 days; in four cases the addition of typhoid vaccine was necessary. In two cases the iritis became worse, but the eye recovered when typhoid vaccine was used. Four patients had tuberculous changes which improved under therapy with hydrolizate of ACTH and streptomycin. In addition two patients with scleritis and keratitis were helped with hydrolizate of ACTH. (1 table, 26 references) Sylvan Brandon.

Pinchon, S. **Cervical lesions and the syndrome of Fuchs.** Bull. et mém. Soc. franç. d'opht. **67**:151-164, 1954.

The purpose of this study was to clarify the etiology of Fuchs' heterochromia and to refer this syndrome to lesions of the cervical spine and the sympathetic chain.

The importance of a detailed history, general medical check-up and radiography of the cervical vertebrae through various exposures in every case of complicated heterochromia, are emphasized. The possible medico-legal problems in similar cases are outlined as the changes of the vertebrae might be ascribed to professional micro- and macrotraumatism. A systematic search for cases of heterochromia and sympathetic lesions in the presence of cervical osteo-arthropathy is suggested to promote a better evaluation of their simultaneous or separate occurrence. Other theories on the etiology of the Fuchs syndrome are reviewed by the author and critically appraised by the discussers

(Paufique, E. Redslob, Merle, Franceschetti, Busacca, and R. Weekers).

Alice R. Deutsch.

Seidler-Dymitrowska, M., and Dzierzykraj-Rogalski, T. **Iridoschisis, a rare disease of the iris.** Klinika Oczna **24**:207-213, 1954.

The authors present a case of iridoschisis in a man, 19 years of age. The anterior layer of the iris in the right eye was detached. The history did not give any clues as to the cause. The pupillary function was normal, indicating normal sphincter and dilator muscles in the posterior layer of the iris. There was some degree of microcornea, suggesting the possibility of congenital malformation. The left eye had a large adherent leucoma with some fresh degenerative changes on the surface. The patient stated that the left eye was defective at birth. (3 figures, 1 table, 18 references)

Sylvan Brandon.

9

GLAUCOMA AND OCULAR TENSION

Cucco, G. **Hemorrhagic glaucoma: pathogenesis, clinical significance, and classification.** Boll. d'ocul. **34**:17-40, Jan., 1955.

The author states that hemorrhagic glaucoma is a form of glaucoma for which there is still no convenient and definite classification. He believes it to be an ocular manifestation of a general vascular disturbance and not secondary to concomitant ocular abnormality which in reality represent manifestations of the same general vasculopathy. (8 figures, 31 references) William C. Caccamise.

D'Ermo, F., and Salvi, G. L. **The permeability of the blood-aqueous barrier in myopic subjects with chronic glaucoma.** Boll. d'ocul. **34**:98-108, Feb., 1955.

The author noted the delayed appearance of fluorescein in the aqueous humor of myopes with chronic glaucoma and attributed this phenomenon to sclerotic vascular lesions which may play a role in the development of ocular hypertension. (4 figures, 24 references)

William C. Caccamise.

Espildora-Luque, C., and Eggers, C. **Retinal angioscopy and peripheral visual field in chronic glaucoma.** Arch. chil. de oftal. **11**:117-123, July-Dec., 1954.

The authors feel that the typical nasal visual field defect, the not-so-typical concentric constriction, or the temporal field defects in chronic glaucoma cannot be explained satisfactorily on the basis of compression of the optic nerve fibers, compression of the vessels, or the glaucomatous cupping itself. The explanation lies rather in vascular change, as postulated by Magitot; except that he localized the lesion in the prechiasmatic region, whereas the authors believe that the lesion lies in the retina itself. In 12 of 66 eyes with chronic glaucoma retinal angioscopy was negative and the visual field was normal. In 54 cases the angioscopy was positive, with congruent results of field study in 38 and incongruent in 16. These data emphasize the secondary importance of the increased intraocular pressure as compared to the vascular lesion in the development of the visual field defects. Angioscopic studies should be done in all patients with glaucoma. (2 figures, 3 references) Walter Mayer.

Espildora-Luque, C., Thierry, I., and Espildora-Couso J. **Diamox in the treatment of glaucoma.** Arch. chil. de oftal. **11**: 106-116, July-Dec., 1954.

The authors have used diamox in four cases of acute glaucoma with excellent results, and in these cases, combined with miotics, operation was unnecessary even after discontinuing diamox because the

tension remained normal. In chronic glaucoma they have had less dramatic results and feel that diamox should be only a coadjuvant prior to surgery in order to place the eye in better condition for the operation.

The authors also feel that diamox may be a valuable aid in determining the type of surgery to be performed. If chronic glaucoma responds rapidly to diamox, a cyclodiathermy would be more advisable than a fistulizing procedure. Diamox is also an invaluable aid in secondary glaucoma; in six cases in which the glaucoma was secondary to iridocyclitis the result was satisfactory. (4 figures, 4 references) Walter Mayer.

Grant, W. M., and Trotter, R. R. **Tonographic measurements in enucleated eyes.** A.M.A. Arch. Ophth. **53**:191-200, Feb., 1955.

Tonographic measurements were made on enucleated eyes to evaluate some of the uncertainties of clinical tonography. Little difference was found between the faculty of outflow in living eyes and those which have been enucleated. This suggests that a stable structure rather than some function of the general circulatory or nervous system is responsible for the resistance and that in patients the factors responsible for normal resistance to outflow are not dependent upon general circulation and nervous system. (5 figures, 1 table, 7 references) G. S. Tyner.

Heckenhahn, Karlheinz. **Pyridostigmin in the treatment of glaucoma.** Klin. Monatsbl. f. Augenh. **126**:334-335, 1955.

This drug is a pyridin derivative of prostigmine. It is used in a 5-percent solution and is less toxic than prostigmine. The effect on the intraocular pressure was tested on 39 glaucomatous eyes. It was not superior to prostigmine though perhaps somewhat less irritating (2 references) Frederick C. Blodi.

Lepri, G., and Andreani, D. **Acetazolamide (diamox), a new inhibitor of carbonic anhydrase in glaucoma therapy.** Arch. di ottal. **58**:313-326, Sept.-Oct., 1954.

Diamox was used on 10 normal and 35 glaucomatous subjects. (5 tables, 5 references) John J. Stern.

Leydhecker, W., and Helferich, E. **Decrease in intraocular pressure after diamox.** Klin. Monatsbl. f. Augenh. **126**: 323-327, 1955.

The authors gave 750 mg. diamox orally once to 22 subjects and the intraocular pressure was decreased in all eyes tested (35 eyes with primary glaucoma, 2 with secondary glaucoma, and 2 normal eyes). Some of the patients continued to take 250 mg. three times a day. The advantages of diamox are emphasized. (2 figures, 2 tables, 11 references) Frederick C. Blodi.

Paiva, Clovis. **Five years of practice with iridencleisis.** Rev. brasil. oftal. **14**: 3-14, March, 1955.

The author reports the satisfactory results he has obtained with iridencleisis in almost 200 cases of primary simple glaucoma operated upon during the past five years. After giving the history of the operation and describing in detail the technique of Holth, he arrives at the following conclusions: the iridencleisis is more easily performed than the other antiglaucoma operations; the ocular tension becomes normalized in about 90 percent of the cases; there are fewer postoperative complications; the filtering scars are flatter than the scars obtained with the other types of filtering procedures; reduction in ocular tension is never too great; and it is an operation which from the standpoint of gonioscopy may be used in any type of primary simple glaucoma. (9 figures, 15 references) Walter Mayer.

Protopopov, B. W., and Dobrotina, A. N. **Study of higher nervous activity in**

patients with glaucoma. Vestnik oftalmologgi **33**:8-10, 1955.

The authors investigated higher nervous activity in a group of glaucoma patients by means of psychologic tests. There were 16 patients, 55 to 70 years of age. It was found that inhibitory cortical reflexes are slowed and the stimulating processes are weak. The authors conclude that in addition to the usual antiglaucomatous treatment, the higher nervous system might be influenced favorably by the administration of bromides.

Sylvan Brandon.

Ross, Reinulv. **Glaucoma secondary to cataract extraction.** Acta opht. **31**:43-64, 1953.

After a review of the literature on the subject, the author presents briefly 22 case histories of glaucoma following cataract extraction. Twelve of the cataract extractions were intracapsular and ten extracapsular. In 20 cases the operation and the postoperative course were attended with complications. The important postoperative complications were postoperative iridocyclitis, defective apposition of the wound margins with incarceration of the iris, capsule or vitreous, and retained soft lens cortex. The glaucoma was acute in 12 cases and chronic in 10. The acute glaucomas developed within a relatively short time after the operation. The interval between the cataract extraction and the onset of chronic glaucoma appeared to be longer than that for the acute glaucomas. There appears to be no pattern of therapy generally applicable; each case must be dealt with individually. The functional results were on the whole unsatisfactory. The author believes that a total iridectomy is a prophylactic against postoperative glaucoma. (1 table, 37 references) Ray K. Daily.

Streitenberg, H. **The influence of rivasin on the intraocular pressure.** Klin. Monatsbl. f. Augenh. **126**:335-336, 1955.

Rivasin is a drug used against cardiovascular hypertension. It also has a sedative effect. It was given to 12 patients in addition to miotics and the results were encouraging. Frederick C. Blodi.

Thierry, Ida. **A case of paradoxical glaucoma.** Arch. chil. de oftal. **11**:168-171, July-Dec., 1954.

The author presents the case history of a one-eyed patient with a glaucoma in whom the tension could be greatly reduced by miotics, but every time this was done the visual acuity and visual field limits were also decreased considerably. A cyclodiathermy was performed; the tension became normal, but the visual acuity and the visual field were markedly reduced. (3 figures) Walter Mayer.

Verdaguer, Juan. **Mechanical theory of glaucoma.** Arch. chil. de oftal. **11**:124-138, July-Dec., 1954.

The author, an enthusiastic proponent of the mechanical theory of glaucoma, describes all the theories and data of American authors to sustain this theory. He emphasizes the necessity of gonioscopic and perimetric studies in all glaucomatous patients, but also thinks it is important that all patients over 40 years of age have the ocular tension measured with a Schiøtz tonometer every time they are seen by an ophthalmologist. (3 figures, 6 table, 7 references) Walter Mayer.

Volokonenko, A. J. **Influence of sleep on the intraocular pressure.** Vestnik oftalmologgii **33**:3-7, 1954.

Therapeutic application of sleep in glaucoma was investigated by the author in 40 patients in different stages of glaucoma. For control eight patients without glaucoma, but in the same age group, were given the same treatment. Only sedative amounts of luminal were given and 11 to 15 hours of sleep was induced. The

treatment lasted from 4 to 12 days. It was found that the patients responded regularly with lower ocular tension only in the initial stages of glaucoma. In advanced stages of glaucoma the response was poor. There was none in absolute glaucoma. To maintain the tension at the normal level it was necessary to use one or two instillations of pilocarpine a day. Removal of either pilocarpine or sleep would bring the tension above 30 mm.Hg. For illustration one case in a woman, 61 years of age, is presented. There was absolute glaucoma in one eye and chronic congestive glaucoma in the other eye, with tension ranging between 36 and 47 mm.Hg when using pilocarpine four times daily. The author feels that the inhibitory influence of the cortex during the sleep causes lowering of the ocular tension. The disturbance in the neurovascular mechanism of the eye is responsible for the elevation of tension. An attempt during the sleep treatment to replace the sedatives with placebos resulted in the gradual increase of the tension in two to four days. The diurnal changes of intraocular pressure are of a reflex nature and are not affected by hydrostatic factors. Sylvan Brandon.

Wudka, E., and Leopold, I. H. **Studies on experimental glaucoma.** A.M.A. Arch. Ophth. **53**:487-494, April, 1955.

This study was conducted to determine the influence of iridectomy on the course of experimentally induced glaucoma in the rabbit eye. On the basis of these studies, the authors are of the opinion that the reduction of ocular tension following iridectomy is not exclusively due to relief of iris bombé. (13 figures, 24 references) G. S. Tyner.

10

CRYSTALLINE LENS

Berrettini, G. L. **Corneal suture in cataract operation with previous opening of the anterior chamber.** Rev. brasil. oftal. **14**:38-46, March, 1955.

The author is of the opinion that the operative accidents during cataract extraction are due to excessive pressure on the ocular globe, and he believes that if this pressure can be prevented, the placement of sutures after the anterior chamber has been opened is more satisfactory than preplaced sutures. He routinely uses an intensive akinesia according to Van Lindt, an Arruga type of speculum, a very wide external canthotomy, a fixation suture in the superior rectus muscle, and he opens the anterior chamber with a von Graefe knife, taking care to stay totally inside the cornea when completing his section at the 12-o'clock position. He places two corneal sutures, extracts the lens and tightens the sutures. He then places two additional sutures. (2 figures, 1 table)

Walter Mayer.

Bouzas, André. **Postoperative results in congenital cataract.** Arch. d'opht. **15**:164-173, 1955.

The author notes that the postoperative results in congenital cataract are in general discouraging and always inferior to those obtained in other forms of cataract. The visual acuity obtained rarely approaches the normal and in one-third of the author's cases the vision was less than 1/10. He analyzes the factors leading to poor acuity and concludes that faulty functional development of the retina is most important but that other factors exist, particularly congenital anomalies. The results were poorest in total cataract, in unilateral cataract, and in cases operated after four years of age; the results were best in eyes that presented no other anomalies, in zonular cataract, and in cases in which surgery was performed between the ages of two and four years. In his series of 154 cases the author employed extracapsular extraction with discission,

sometimes of the posterior capsule, and with total iridectomy in 102 cases. (6 tables, 16 references)

Phillips Thygeson.

De Conciliis, U. **Experimental cataract caused by dinitrophenol.** Boll. d'ocul. **34**: 65-74, Feb., 1955.

An evaluation was made of the effect of dinitrophenol on the glucose content of the blood and crystalline lens of rabbits and young chickens. This was done in an attempt to come to a better understanding of the pathogenesis of the cataractous changes caused by this substance. Those rabbits which received dinitrophenol intracamerally developed lens opacities within at least six hours, while those who received it by the hypodermic route developed no lens changes. Young chickens developed anterior and posterior polar cataracts after receiving dinitrophenol hypodermically. In all of the animals there was a demonstrable decrease in the glucose content of both the blood and the crystalline lens. The author believes that dinitrophenol cataract may be related to a disturbance in the glucose metabolism of the crystalline lens. (1 figure, 5 tables, 47 references) William C. Caccamise.

Gallois, Jean. **Iris vessels and cataracts.** Bull. et mém. Soc. franç. d'opht. **67**:52-57, 1954.

The possible relationship and significance of local and general circulatory abnormalities in the etiology of lens opacities are discussed. The caliber and the number of the iris vessels and a potential relation between the caliber of the iris vessels and the arterial tension was investigated. It seemed that a decrease in the circulation of blood in the iris (visible in biomicroscopy) is more significant for the development of cataract than an increase in arterial tension.

Alice R. Deutsch.

Hilding, A. C. **Reduced ocular tension after cataract surgery.** A.M.A. Arch. Ophth. **53**:686-693, May, 1955.

This study is concerned with the role of hypotony after cataract surgery. Hypotony was a constant finding in all eyes. No cause was found and no damage seems to result from it. (6 figures, 36 references)

G. S. Tyner.

McLean, John M. **Lens and vitreous.** A.M.A. Arch. Ophth. **53**:585-599, April, 1955.

The related literature is reviewed. (152 references) G. S. Tyner.

Miratynska-Rusinowa, E., and Lisiecka-Adamska, H. **Lenticular changes in diabetic patients.** Klinika Oczna **24**:165-173, 1954.

Lenticular changes in diabetics appear in two forms; refractive changes and opacities. The authors examined the eyes of 750 diabetics in the course of seven years. Refractive errors were found in 18 patients (about 2.4 percent), and opacities in 90 patients (about 12 percent). Refractive errors were found mostly in untreated or poorly treated diabetics and mostly after the fortieth year of life. Only 1.7 percent of diabetics had characteristic diabetic opacities. (7 tables, 13 references)

Sylvan Brandon.

Paufique, L., and Etienne, R. **Cataract in fetal, polyepiphyseal chondrodystrophic calcinosis. Cataract in galactosemia.** Bull. et mém Soc. franç. d'opht. **67**:42-44, 1954.

Two types of congenital polyepiphyseal chondrodystrophic calcinosis are recognized. One is characteristed by an extreme shortness of the limbs, caused by multiple calcification points in the epiphyseal lines, frequent total cataracts and hereditary tendency. The second minor group only shows the typical bone changes on

X-ray films but no clinical signs. A case belonging to the first group is described. The authors also observed a two-months-old boy with general edema, a large liver and a disc-shaped cataract in the peripheral layers of the internal embryonic nucleus. The diagnosis of galactosemia was made by adequate laboratory tests. The necessary dietary adjustments were made. Unfortunately the child died one month later of a respiratory ailment. No change in the appearance of the cataract was visible at this time.

Alice R. Deutsch.

Wilczek, Marian. **Methods of operation of soft cataracts.** Klinika Oczna **24**:175-178, 1954.

Discission of soft cataracts frequently leads to unsatisfactory results. Pupillary membranes, synechiae and distorted pupils prevent good vision. Despite the opinion of many ophthalomoligsts, the author feels that linear extraction is preferable to discission. If the lens is only partially opaque the author does a discission of the lens capsule; about two or three weeks later the lens is ready for linear extraction. The operation is done under a general anesthetic. A limbus-based conjunctival flap and incision ab externo are used. The lens material is removed with a spoon. (5 references)

Sylvan Brandon.

11

RETINA AND VITREOUS

Bedrossian, R. H., Carmichael, P., and Ritter, J. A. **Effect of oxygen weaning in retrolental fibroplasia.** A.M.A. Arch. Ophth. **53**:514-518, April, 1955.

The authors believe that a 40 percent concentration of oxygen in the incubator is a maximal level. Improper withdrawal of supplemental oxygen is the commonest precipitating factor. A gradual reduction of supplemental oxygen is indicated. Proper use of supplemental oxygen is of benefit. (2 figures, 4 references)

G. S. Tyner.

Busacca, Archimède. **Sudden inflammatory detachment of the posterior hyaloid membrane.** Arch. d'opht. **15**:129-137, 1955.

The author notes that an inflammatory process in the retina or choroid may suddenly project a serofibrinous exudate towards the vitreous chamber which will detach and elevate the posterior hyaloid. If it is in the macular region, the exudate beneath the hyaloid results in a major reduction in vision. The vitreous detachment persists after absorption of the exudate but the vision may return to normal. The condition is best seen by biomicroscopy, but by ophthalmoscopy differentiation from hemorrhage can readily be made on the basis of color, since in hemorrhage the fundus retains its red color whereas in vitreous detachment it looks gray. The genesis of annular formations in the vitreous is discussed. (5 figures)

Phillips Thygeson.

Carlberg, O., and Gausland, T. **A few cases of retinitis centralis serosa.** Acta ophth. **31**:65-74, 1953.

A brief reference to the literature is followed by a detailed report of four cases. In three the etiology could not be determined. In one case there is the possibility that an electric shock was the causative agent. (13 references)

Ray K. Daily.

Donn, Anthony. **Ultrasonic wave liquefaction of vitreous humor in living rabbits.** A.M.A. Arch. Ophth. **53**:215-223, Feb., 1955.

This work was intended to be a study of the methods by which the intact vitreous could be liquified. Clinical application would be of value in treatment of vitreous hemorrhage and possibly other disturb-

ances of the vitreous. Animal experiments disclosed some harmful effects such as cloudy vitreous, retinal and lens damage. (5 figures, 1 table, 20 references)

G. S. Tyner.

Gormaz, A., and Verdaguer, J. **Two years of experience with scleral resection in the treatment of retinal detachment.** Arch. chil. de oftal. **11**:143-148, July-Dec., 1954.

The authors give statistical data on the 62 cases of retinal detachment in which they used surgery, obtaining good results in 48, improvement in 2, and failure in 16. When a detachment is of one month's duration or longer scleral resection is the procedure of choice, combined with the classical occlusion of the retinal tears by diathermy. Scleral resection is especially indicated in cases of aphakia, pronounced hypotony of the globe, total detachment, recurrent detachment, detachment without visible tears, and detachment with some type of retinitis. The lamellar scleral resection appears to be as effective as the total resection, but is much less difficult to execute and is therefore to be preferred. (3 tables, 5 references) Walter Mayer.

Gurling, K. J. **Evaluation of an androgen, methylandrostenediol, in the treatment of diabetic retinopathy.** Brit. J. Ophth. **39**:151-154, March, 1955.

In 1951 Saskin and his co-workers reported beneficial therapeutic results by the use of testosterone but Bedrossian reported in 1953 that he and his associates could not substantiate this result. Gurling now reports his observation of 27 patients in various stages of diabetic retinopathy treated with a related drug, methylandrostenediol in daily doses of 60 to 200 mg. by mouth. The drug was given alone and with a ganglion-blocking drug for hypertension. In no case was the diabetic retinopathy appreciably altered. (2 tables, 6 references) Morris Kaplan.

Kahnemann, Francesco. **External exudative retinitis of the macula. Clinical report and etiopathogenic discussion.** Ann. di ottal. e clin. ocul. **81**:125-138, March, 1955.

The literature dealing with this and other forms of exudative retinitis is reviewed and a case is described. In view of the anamnesis of his patient (exposure to an arc lamp in his work as projectionist and exposure to an unprotected electric welding arc on the day before loss of vision occured) and a positive tuberculin skin test, the author assumes that the condition can be attributed to damage from luminous radiation through an edema-causing process in an allergic subject. (2 figures, 40 references)

John J. Stern.

Kozłowski, Bogumil. **Chorioretinitis centralis serosa.** Klinika Oczna **24**:215-218, 1954.

A case of central retinal chorioretinitis is presented. It appeared in a man, 34 years of age, soon after an attack of sore throat. The patient noted failing vision and edema of the macular area of two disc diameters was found. All general tests were negative. X-ray films showed the presence of a mucocele in one antrum. Within two months the condition of the macula returned to normal with complete recovery of the function of the retina. The author feels that in addition to tuberculosis, focal infections should be taken in consideration in a search for the etiology of serous central chorioretinitis. (1 figure, 8 references) Sylvan Brandon.

Krause, Arlington C. **Effect of retrolental fibroplasia in children.** A.M.A. Arch. Ophth. **53**:522-529, April, 1955.

All of the children with retrolental fibroplasia of the University of Chicago Clinics were studied for the purpose of determining their ultimate progress. The oldest child was born in 1937. 107 children were

studied. 78 attended some kind of school, 16 were at home, 17 were in a state institution for retarded children and 9 had died. Physical or neurological defects were present in 24 children. The majority, 71, had good mentality. 36 were retarded mentally to some extent. The death rate of survivors was 8.5 percent. Death occurred usually from infections and neurological disease unrelated to retrolental fibroplasia. (3 tables) G. S. Tyner.

McFarland, Corley B. **Heredodegeneration of the macula lutea.** A.M.A. Arch. Ophth. **53**:224-228, Feb., 1955.

A family with this disease is described. Clinical characteristics of the disease are discussed. Three types of degeneration are found: 1. a flat, circumscribed, reddish lesion; 2. an elevated cystic lesion which ruptures in adolescence or adulthood; and 3. a salt and pepper-like pigmented macular lesion. This family had the second type disease. It is a dominant genetic trait. (2 figures, 9 references) G. S. Tyner.

Otto, J. **Rare fundus changes in hemolytic icterus.** Klin. Monatsbl. f. Augenh. **126**:327-333, 1955.

Many organs and systems show pathologic changes in hemolytic icterus and the term "hemolytic constitution" is therefore preferable. Anomalies of the skull (towerskull) and of the long bones are frequent. The ear lobes may be malformed. Among the ocular complications are: epicanthus, exotropia, microphthalmus, oval cornea, corneal opacities, ectropium uveae, heterochromia, cataract, persisting hyaloid artery, and optic atrophy.

A 26-year-old woman had a towerskull, small earlobes, defective dentition and anemia. One grandmother apparently had hemolytic icterus. The eyes were myopic. There was a marked exophthalmus and right hypertropia. The fundi showed an unusual, segmental retinal pigmentation. The visual fields had corresponding defects. The dark adaptation was normal. (10 figures, 11 references)

Frederick C. Blodi.

Reese, A. B., Hyman, G. A. Merriam, G. R., Jr., Forrest, A. W., and Kligerman, M. M. **Treatment of retinoblastoma by radiation and triethylene melamine.** A.M.A. Arch. Ophth. **53**:505-513, April, 1955.

This type of treatment has been used in patients with bilateral tumors in whom the eye with the more advanced disease has been enucleated. 148 patients have been treated; 43 died of the disease. Useful vision was retained in 36.2 percent of the treated cases.

Vitreous hemorrhage was the most frequent complication. Cataract formation has not been a problem. The authors conclude that triethylenemelamine and radiation exert a synergistic effect and provide the best method of treating this type of tumor.

The method of treatment is described. A total of 2400 r/air is given within one month in divided doses of 400 r/air three times weekly. Triethylenemelamine is an analogue of nitrogen mustard. A total dose of 15 mg. is given in five divided doses. The dose is regulated by the hemopoetic response over an extended period of time. (5 figures, 3 tables, 12 references)

G. S. Tyner.

Swan, K. C., and Christensen, L. **Scleral changes induced by diathermy in retinal detachment.** A.M.A. Arch. Ophth. **53**:664-670, May, 1955.

Human eyes to be enucleated were first subjected to diathermy as used in retinal detachment. Studies of these eyes revealed that minimal damage resulted when strengths of current were used which just would permit ready passage of the electrode needle through the sclera. The local effect of the current is intensified by a dry field. Satisfactory surface

shrinkage could be obtained best with the higher frequency vacuum-tube-generated current. Damage is greater when the spark gap current is used. Pischel's technique of partially penetrating small needles is better than large surface electrodes. Widespread contraction of the sclera was best obtained with a 5 mm. "meatball" electrode. (5 figures, 4 references) G. S. Tyner.

Voisin, J., and Lombard, J. **Pseudoxanthoma elasticum and macular lesions without angioid streaks.** Bull. et mém. Soc. franç. d'opht. **67**:111-116, 1954.

A 62-year-old woman with pseudoxanthoma elasticum, bilateral degeneration of the macula and surprisingly good vision is described. No angioid streaks were visible. Tortuosity of the small retinal arteries, a positive compression symptom, disturbances in the circulation of the inferior extremities with decreased oscillometric index of the inferior third of the leg, revealed the possible vascular origin of the chorio-retinal lesions.

Alice R. Deutsch.

Wagener, Henry P. **Diseases of the retina and optic nerve.** A.M.A. Arch. Ophth. **53**:722-754, May, 1955.

The pertinent literature is reviewed. (232 references) G. S. Tyner.

Weiner, R. L., and Falls, H. F. **Intermediate sex-linked retinitis pigmentosa.** A.M.A. Arch. Ophth. **53**:530-535, April, 1955.

Attention is called to the diagnostic importance of a "tapetal-like" retinal luster in heterozygous female carriers of the disease. This luster can be recognized ophthalmoscopically and is described as a "golden, glistening, granular sediment" in the perifoveal area. A female carrier thus recognized will pass the disease to 50 percent of male offspring. 50 percent of female offspring will be carriers. (2 figures, 3 references) G. S. Tyner.

Zanen, J, Mennier, A., and Piroux, P. **Retinopathy in prematures and oxygen.** Bull. et mém. Soc. franç. d'opht. **67**:88-110, 1954.

A summary of the present knowledge on retrolental fibroplasia is given as well as a description of the facilities at the pediatric service of Brussels for the control of oxygen therapy of prematures. Attention was called to the fact that the same amount of oxygen per minute may give a different concentration of oxygen in different incubators. Oxygen should be given only when absolutely necessary and should be discontinued gradually. In case of the appearance of a retinopathy under normal atmospheric pressure, moderate amounts of oxygen should be reinstated and again slowly terminated as indicated. Anemic prematures are especially sensitive to anoxemia and small blood transfusions should be given simultaneously with oxygen therapy. In spite of every precaution prematures below a birth weight of 1,200 grams still are in great danger of getting this alarming disease. (6 references, 7 figures, 3 tables)

Alice R. Deutsch.

12

OPTIC NERVE AND CHIASM

Funder, Wolfgang. **Senile changes in the physiologic excavation of the optic nervehead.** Klin. Monatsbl. f. Augenh. **126**:320-323, 1955.

In 1953 M. Proksch (Klin. Monatsbl. f. Augenh. 122:168) found that physiologic excavations increase with age. The author examined 913 eyes and also found an increase in the size of the excavation with age. This was more pronounced in patients with hyperopia. (1 table, 5 references). Frederick C. Blodi.

Kazdan, P., and Kennedy, R. J. **Intravenous treatment of optic neuritis.** A.M.A. Arch. Ophth. **53**:700-701, May, 1955.

Intravenous typhoid therapy was as effective in treating this disease as intravenous corticotropin in a controlled series of patients. (1 table, 9 references)

G. S. Tyner.

13

NEURO-OPHTHALMOLOGY

Bessiere, E., Fritsch, and Juliard. **Observations on photophobia.** Arch. d'opht. **15**:10-15, 1955.

The authors review the literature on photophobia starting with the work of Claude Bernard, and then report experimental studies of their own. They note that photophobia of ocular origin arises from anterior segment disease, and that the photophobias of central nervous origin are seen in certain types of encephalitis. They conclude that the phenomenon of photophobia requires 1. the integrity of the peripheral and central trigeminal paths, and 2. the integrity of the retina and of the homolateral portion of the optic nerve-diencephalon pathway. They state that a lesion of the geniculate-cortical pathway does not prevent photophobia but on the contrary may in certain cases even favor it. (10 references)

Phillips Thygeson.

Blagojevic, M., and Milenkovic, P. **Unusual pathogenesis of the Foster-Kennedy syndrome.** Bull. et mém. Soc franç. d'opht. **67**:226-234, 1954.

The case history of a 47-year-old man, with an epithelioma of the pituitary gland which invaded the sella and the right optic canal, is reviewed. Clinically he displayed a combination of the Foster-Kennedy and the chiasmal syndrome. Because of the asymmetrical growth of the tumor, the infiltration of the optic canal and of the intervaginal and subdural spaces caused a primary optic atrophy on the right side. The encroachment on the chiasm brought about the temporal hemianopsia. The resulting intracranial hypertension produced the papilledema in the left eye. The blindness of the right eye and the loss of the temporal field of the left eye together with a considerable enlargement of the sella as shown by X-ray examination suggested pituitary disease. In analyzing this observation the authors emphasize the localizing importance of the Foster-Kennedy syndrome but also stress the fact that it is not of absolute value in this respect, as the optic atrophy may be caused by direct pressure of the neoplasm on the nerve, or indirectly as a result of enlargement of the third ventricle or abnormalities of the brain itself. (23 references)

Alice R. Deutsch.

Bonnet, P., and Bonnet, J. **Opthalmological signs of cerebral angiomatosis.** Bull. et mém. Soc. franç. d'opht. **67**:235-240, 1954.

Cerebral angiomatosis frequently is combined with angiomatosis of the skin and the retina. The present study deals exclusively with the simple subcortical angiomatosis of the temporo-occipital lobe. This congenital anomaly gives rise to temporary disturbances such as Jacksonian epileptic episodes, recurrent meningeal hemorrhages or crises of ophthalmic migraine in early childhood. In late adolescence an impairment of the general health is often associated with generalized epileptic episodes, severe meningeal hemorrhages, hemiparesis and homonymous hemianopsia, and also psychic disturbances. The fundus is usually normal but retinal hemorrhages and papilledema have been described. Homonymous hemianopsia in the presence of meningeal hemorrhages in a young adult should very strongly suggest a pure cerebral angiomatosis, usually located in the area of the

middle cerebral artery. This disease represents 10 percent among intracranial diseases. It should be remembered that ophthalmic migraine sometimes has a very definite organic origin and not only a functional course. An illustrative case history is discussed in detail. Alice R. Deutsch.

Boruchoff, S. A., and Goldberg, B. **Edrophonium (Tensilon) in diagnosis of ocular myasthenia gravis.** A.M.A. Arch. Ophth. **53**:718-719, May, 1955.

Edrophonium (Tensilon) may give a positive test for myasthenia where prostigmine fails. 1 cc. (10 mg.) of the drug is given intravenously. Its action is almost immediate. (2 figures, 3 references)

G. S. Tyner.

Cavka, V. **Ophthalmo-neurological symptoms after prefrontal lobotomy and frontal topectomy.** Bull. et mém. Soc. Franç. d'opht. **67**:201-219, 1954.

Systematic neuro-ophthalmological examinations as well as tabulations of the intraocular pressure were made in a series of psychopathic patients after either a prefrontal or transorbital lobotomy, or a prefrontal lobectomy. Anisokoria was found in 90 percent of the patients, 75 percent had the dilated pupil on the side of the operation; conjugate deviation was present in 56 percent; horizontal divergence in 55 percent, and vertical divergence in 20 percent. A few patients had some jerking in the horizontal movements and some had monocular or binocular nystagmus. Most of these symptoms were reversible and originated in the frontal region of the brain. Ocular tension and blood pressure varied within physiologic limits but a synchronism between ocular tension and blood pressure was only found occasionally. A localization of the regulating centers in the cortical or subcortical region was considered a possibility. (10 references, 3 figures, 2 tables)

Alice R. Deutsch.

Jamieson, Kenneth G. **A mechanism of primary occulomotor nerve injury.** Austral. & New Zealand J. Surg. **24**:236-238, Feb., 1955.

Oculomotor nerve lesions are recognized as being of special significance in cases of head injury. The delayed development of a fixed and dilated pupil is usually indicative of an ipsilateral space-occupying lesion and the mechanism of its production is by pressure on the nerve by trans-tentorial herniation of the uncinate portion of the temporal lobe. But not all oculomotor nerve lesions resulting from head injury are of this type, and primary nerve injury requires differentiation. Four cases of primary oculomotor nerve lesions in head injury are presented, and the diagnostic features (rapid development of a fixed dilated pupil together with involvement of the external ocular musculature supplied by the third cranial nerve) are described. The author suggests that the mechanism of nerve damage is that of stretch injury—the result of a blow in the anterior temporal region without damage to the superior orbital fissure. (2 references)

William C. Caccamise.

Kearns, T. P., Wagener, H. P., and Millikan, C. H. **Bilateral homonymous hemianopsia.** A.M.A. Arch. Ophth. **53**:560-565, April, 1955.

The sudden simultaneous development of bilateral homonymous field defects associated with brain stem signs such as nystagmus and internuclear ophthalmoplegia is almost pathognomonic of occlusion of the basilar artery. Three cases from the Mayo Clinic are reported. Necropsy of the one fatality is confirmatory. (5 figures, 13 references)

G. S. Tyner.

Larmande, A., and Sutter, A. **Association of visual acuity and specific dislexia.** Bull. et mém. Soc. franç. d'opht. **67**:220-225, 1954.

The faculty of reading consists of two

essential elements: one is visual, the recognition of the form of the characters; the other is intellectual and provides interpretation of the forms. The inability to interpret and a dissociation of the two fundamental components establish the cause of specific dislexia. As long as the child is incapable of identifying printed symbols the dissociation is absolute. Later on and by training, letters are recognized by details and not as symbols, a perception peculiarity which demands very acute vision and more training than the fast and less precise recognition of symbols. At this point the dissociation is relative and there is a remarkable difference in the visual acuity present and the evaluation of the reading chart.

Reading difficulties affect a comparatively large number of schoolchildren. Its effect on the child's development, the pitfalls in ophthalmologic diagnosis and the training of these children are outlined by the authors and the discussers (J. Voisin and J. Sedan) of this paper.

Alice R. Deutsch.

Robinson, Benjamin E. **Permanent homonymous migraine scotomata.** A.M.A. Arch. Ophth. **53**:566-567, April, 1955.

A rare instance of permanent scotomata associated with migraine is reported. The defect originated as a complete right homonymous hemianopsia with sparing of the macula. Improvement occurred so that the residual defect is a bilateral, dense, right superior quadrantic paracentral scotoma. (1 chart) G. S. Tyner.

14

EYEBALL, ORBIT, SINUSES

Ducluzaux, M. **Facial asymmetry and anisometropia.** Bull. et mém. Soc. franç. d'opht. **67**:117-126, 1954.

A relationship between facial asymmetry, intranasal disease and monocular astigmatism was investigated in five subjects. Though a considerable nasal disturbance could cause a deformation of the orbital wall and consequently produce a change in corneal curvature, it seems hard to understand how minimal nasal lesions could possibly cause a considerable astigmatism which would disappear after surgery. This fact was stressed by the discusser, E. Hartman, who asked for more detailed pre- and postsurgical measurements which could be done by tomography. (6 figures) Alice R. Deutsch.

Leavelle, Robert B. **Gas gangrene panophthalmitis.** A.M.A. Arch. Ophth. **53**: 634-642, May, 1955.

53 cases of this type are reviewed. In all cases 1. infection followed a perforating wound of the globe; 2. despite any and all therapeutic measures undertaken, the infection progressed, destroying all visual function; 3. the infected globe was either eviscerated or enucleated, or the entire orbit exenterated; 4. postoperative recovery was essentially uneventful and complete. There is no satisfactory treatment. Antitoxin is of questionable value. (1 table, 42 references) G. S. Tyner.

15

EYELIDS, LACRIMAL APPARATUS

Azadeh, M., **Two new methods of suturing in the operation for entropion.** Ann. d'ocul. **187**:1081-1084, Dec., 1954.

Using modifications of the techniques of Panas and Hotz, the authors describe two new methods of suturing in which a zigzag continuous suture is used. One method is applicable to young patients, the other to old. They recommend this suture in all operations on the lids, claiming that scarring is less, and removal of the sutures simpler. (3 figures)

John C. Locke.

Bonola, A. **The methods of obtaining skin grafts for palpebral reconstructions.** Ann. di ottal. e clin. ocul. **81**:105-112, March, 1955.

Except for large defects, where skin from the arm, the thigh or the abdomen was used, the author obtained skin grafts from the retro-auricular area. The grafts are taken with a small dermatome made in the Argentine in which safety razor blades are used. It is capable of producing grafts up to .60 mm. in thickness and up to 4 mm. wide. In young patients grafts of 0.3 to 0.4 mm. thickness are used. Three-quarter thickness grafts (0.5 to 0.6 mm.) give optimal results in adults. Full-thickness grafts (0.8 to 1.0 mm.) become attached less easily and are too thick for palpebral repair. The article is illustrated by drawings of the technique of upper lid repair, photographs of the dermatome, and seven patients before and after surgery. (9 figures) John J. Stern.

Lagos, Eduardo J. J., **Medical and surgical treatment of the lacrimal system.** Arch. chil. de oftal. 11:160-163, July-Dec., 1954.

All the diseases which may affect the lacrimal system, including ocular affections which may produce tearing, are reviewed and the classical methods of treatment for the various diseases are described. Walter Mayer.

Oliver Schneider, Ernesto. **Intubation of the nasolacrimal duct in chronic dacryocystitis.** Arch. chil. de oftal. 11:139-142, July-Dec., 1954.

The author presents 18 cases in which he intubated the nasolacrimal duct with polyethylene tubing, and concludes that the best results are achieved in cases of chronic dacryocystitis with ectasia of the sac. He did not have good results in simple dacryocystitis with atresia of the sac and in patients above 45 years of age. (2 tables) Walter Mayer.

Peyret, Jorge A. **Stricturotomy and intubation of the nasolacrimal duct in the treatment of low dacriostenoses.** Arch. oftal. Buenos Aires 29:535-540, Oct., 1954.

It was Poulard's claim that by splitting the lower canaliculus and incising the narrowed upper portion of the lacrimal duct with a Weber knife, most cases of infrasacular dacryostenoses could be permanently relieved, provided that repeated passage of very large probes (sizes 10 through 14) was subsequently done. After stricturotomy—which he performs with a curved Terson knife—and, in order to secure the reestablishment of patency, the author introduces through the sac into the lacrimal duct a short polyethylene tube which is left *in situ*. In nine out of ten cases the operation was entirely successful, while in the remaining one the canula happened to be dislodged into the lower canaliculus. (25 references)

A. Urrets-Zavalia, Jr.

16

TUMORS

Gaul, L. Edward. **Syringoma of the eyelids.** A.M.A. Arch. Ophth. 53:671-675, May, 1955.

Syringomas are benign, usually on the lower lid but may be present on the upper, bilateral, occur only after puberty and are asymptomatic. Three types are found, plaque, globoid and dimple. The color varies from white to yellow to flesh colored. They vary in size from 1 mm. to 1 cm. (4 figures, 14 references)

G. S. Tyner.

Godtfredsen, E., and Lindgren, S. **Orbital, palpebral, and epibulbar lymphomas.** Acta opht. 31:29-41, 1953.

After a review of the literature on benign lymphomas the author reviews the histories of 12 cases of verified ocular lymphoma. Seven were in the lacrimal gland, three in the eyelids and orbit, and two were epibulbar as well as orbital. Nine of the patients were women, and the

age range was from 18 to 66 years. A general examination showed that the lesions were purely local. The treatment was radiologic, except in the first two cases in which the patients were treated surgically because of suspected malignancy. Local recurrence was seen in two cases, and was controlled with X-rays. (23 references)

Ray K. Daily.

Manzitti, E., and Paris, V. M. **Ocular symptoms of sympathico-blastoma.** Arch. oftal. Buenos Aires **29**:541-554, Oct., 1954.

Sympathicoblastoma, a malignant tumor originating from the primitive pluripotential cell which normally goes to make up the suprarenal medulla and the sympathetic ganglia, occurs in infancy and may give rise to early metastases, of which those affecting the orbit and the bones of the skull are most common. Accordingly, exophthalmos, palpebral ecchymoses, and tumors scattered over the cranial surface are among the first manifestations to be observed. Irritability, articular aches, fever and anemia are usually present from the start, while hepato- and splenomegaly develop in late stages. In time, a tumor mass may come to be palpated in the abdomen. Cachexia and death supervene in a few months. It is noteworthy that the ecchymoses of the eyelids usually appear in a spectacles-like distribution.

Three cases of this relatively rare condition are described, in all of which the diagnosis was supported by pathologic examination of biopsy material. (3 figures, 4 references) A. Urrets-Zavalia, Jr.

McGavic, John S. **Lymphomatous tumors of the eye.** A.M.A. Arch. Ophth. **53**:236-247, Feb., 1955.

A follow-up study on 20 of 21 patients reported in 1942 is described. Combined X-ray and surgical therapy is indicated. Five of the patients are still alive, five died of other causes and 10 died of the disease. (1 figure, 13 tables, 38 references)

G. S. Tyner.

17

INJURIES

Charamis. **Unusual eye injuries caused by bullets from hunting rifles.** Bull. et mém. Soc. franç. d'opht. **67**:77-87, 1954.

Four case histories of patients injured by rifle bullets are discussed to demonstrate the variety of such injuries. The seriousness and the amount of intraocular damage in nonperforating injuries depend on the violence of the contusion and on the passage way of the bullet. The first case was especially interesting as the lead crossed the orbit without touching the eyeball and lodged at the base of the skull at the side of the cavernous sinus. Besides a severe chemosis and palpebral swelling, the patient also had an internal ophthalmoplegia and the fundus picture of embolus of the central artery. The eye was blind. In two other patients the lead was removed from the sclera and the retinal tears and disinsertion brought about by the contusion were closed. The visual results were excellent. The fourth case showed a double perforation of the sclera, caused by the projectile traversing the eyeball and finally resting in the sclera on the opposite side. The projectile was removed, the wounds closed and the retinal tears were sealed. The favorable outcome is ascribed to the prompt surgical intervention. Each case must be handled individually. Pieces of deeply embedded lead, intra- or extra-ocular should not be disturbed. Alice R. Deutsch.

D'Ermo, F. **Ocular lesions caused by atomic energy.** Boll. d'ocul. **34**:41-60, Jan., 1955.

The author reviews the literature pertaining to ocular alterations caused by atomic energy: these lesions are chiefly

of the crystalline lens but may also affect other ocular tissues, sometimes with late manifestations. (21 references)
William C. Caccamise.

Havener, W. H., Falls, H. F., and McReynolds, W. U. **Burdock bur ophthalmia.** A.M.A. Arch. Ophth. **53**:260-263, Feb., 1955.

Cockleburs are found in all 48 states and produce severe ocular inflammation when imbedded. They produce both toxic and mechanical injury. The burrs are best removed with a jewelers forceps under slit-lamp magnification. Prior instillation of epinephrine facilitates exposure of the burr. (6 figures, 2 references)
G. S. Tyner.

Krahnstoever, Max. **Late damages to the eye with hydroquinone.** Klin. Monatsbl. f. Augenh. **126**:340-341, 1955.

A laborer was first seen in 1936 with the typical conjunctival pigmentation in both eyes. He was advised to leave the plant in which he had worked for seven years. Nevertheless, he developed corneal opacities in 1943 and severe corneal ulcers in 1952. (4 references) Frederick C. Blodi.

18

SYSTEMIC DISEASE AND PARASITES

Kiel, Eduard. **Ocular affections with maggots.** Klin. Monatsbl. f. Augenh. **126**: 342-344, 1955.

This is a rebuttal to Hartmann's remarks (Kl. Mbl. Augenh. 124:194, 1954) on Kiel's original paper; Kiel maintains his point that these larvae penetrate the sclera and so reach the vitreous and anterior chamber. He refutes the idea that they could perforate the limbus and so reach the anterior chamber directly. (1 table, 7 references) Frederick C. Blodi.

Recupero, Enzo. **Ocular changes in infantile internal leishmaniasis.** Arch. di ottal. **58**:443-468, Sept.-Oct., 1954.

Among 50 infants and young children with visceral leishmaniasis, five were seen with retinal hemorrhages of various size, form and site; in one child a partial thrombosis of the central retinal vein was found. The hemorrhages are attributed to vascular fragility, a low platelet count and prolongation of the prothrombin time. The thrombosis is assumed to have been due to endothelial changes and to the slowing of the blood stream. (44 references) John J. Stern.

Shereshevskaia, O. J. **Ophthalmological observations in obliterating endarteritis.** Vestnik oftalmologii **33**:11-16, 1954.

The author studied ocular symptoms in patients with obliterating endarteritis. In one group of 50 patients the eyes were examined in great detail and in another of 80 patients, only the eyegrounds and the vision were checked. In 40 of the first 50 patients there were vascular changes, usually more marked on the side of active endarteritis, consisting of angiospasms, atonic dilations, sclerotic changes and vasculitis. No direct relation was found between the retinal changes and the phase of endarteritis of the extremities. The intraocular blood pressure was normal in half of the patients and slightly elevated in the other half, and there was no definite relation to general blood pressure which was mostly normal. The visual fields were slightly contracted, not more than 10 to 20°, but the blind spot was greater on the side of the affected extremity. Among 50 patients treated with tissue therapy, a decrease of the blind spot or angioscotoma occurred in 37. Sylvan Brandon.

19

CONGENITAL DEFORMITIES, HEREDITY

Edeskuty, O. **Congenital tortuosity of retinal vessels.** Klin. Monatsbl. f. Augenh. **126**:217-218, 1955.

It has been assumed that this manifes-

tation is caused by a loss of tonus and elasticity of the longitudinal muscle fibers in the vessel wall. The author believes that it is the sequel of a disproportion of scleral and retinal growth. It may be expected to occur more frequently in hyperopia. 14 patients with tortuosity, bilateral or unilateral, often showed a more pronounced tortuosity in the more hyperopic eye. Frederick C. Blodi.

Elwyn, Herman. **Heredodegenerations and heredoconstitutional defects of retina.** A.M.A. Arch. Ophth. **53**:619-633, May, 1955.

The author reviews and classifies the hereditary degenerations of the retina and correlates them with the site of disturbance in the various layers of the retina. The following retinal elements may be affected in these diseases: Bruch's membrane, the rods and cones, the cells of the inner nuclear layer, and the ganglion cells. The pigment epithelium is unaffected by this group of diseases. The numerous diseases in this group are classified under five headings: 1. heredodegenerations of Bruch's membrane, 2. heredodegenerations of the neuroepithelium, 3. heredoconstitutional defects of the neuroepithelium, 4. heredodegeneration of the inner nuclear layer, and 5. heredodegenerations of the ganglion cells. (26 references) G. S. Tyner.

Esente, I., and Doni, A. **Retinitis pigmentosa and keratoconus.** Gior. ital. oftal. **8**:23-41, Jan.-Feb., 1955.

Among 100 patients with retinitis pigmentosa between the ages of 18 and 35 years, ten also had keratoconus. These patients are described in detail. Seven other patients with keratoconus but without retinitis were also studied. In those in whom the two lesions were associated, other abnormalities were found, too, especially malformation of the lumbosacral portion of the spinal column. This led the authors to assume a common origin for the two manifestations. (10 figures, 20 references) V. Tabone.

Nonnenmacher, Heinz. **Ophthalmologic considerations in the Sturge-Weber syndrome.** Klin. Monatsbl. f. Augenh. **126**: 154-164, 1955.

A four-year-old boy with bilateral teleangiectasia of the face extending onto the trunk and the arms is described. The teleangiectasia was more pronounced on the right side and there was a hyperplasia of the right side of the face. Both eyes were enlarged. The intraocular pressure was increased in both eyes and an iridencleisis was done. There was also a hypertrophy of the right leg and the boy limped. Localized teleangiectasia with osseous hypertrophy are characteristic of the Parks-Weber syndrome. (5 figures, 26 references) Frederick C. Blodi.

20

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Biernacka-Biesiekierska, J., Szretter, R., and Dydyńska, M. **Monocular vision in work.** Klinika Oczna **24**:219-235, 1954.

The influence of monocular vision on normal types of work was investigated. Monocularity was considered not only when there was total loss of the eye but also when the globe was preserved but the vision was abnormally low. Precise use of the hands at work does not depend on the eye control only; the senations from the muscles and joints are very important. The authors devised a method for measuring precision and accuracy of hand movements. The subject is asked to touch certain areas with a sharp point. 55 one-eyed boys and girls were examined and 55 boys and girls with perfectly normal binocular vision were used as controls. It was found that accuracy was better in those with binocular vision, and it is better in acquired and left-sided monocularity.

The rapidity of hand movements was better in two-eyed individuals. (3 figures, 21 tables, 32 references)

Sylvan Brandon.

Carr, Lela B. **Preschool blind children and their parents.** Children **2**:83-88, May-June, 1955.

The author gives urgently-needed advice to parents, teachers, and the personnel of social agencies concerning their duties, responsibilities, and privileges in the guidance of the blind child during his pre-school development. (3 figures)

F. H. Haessler.

Coutela, C., and Halbron, P. **Artificial lighting in ophthalmology.** Ann. d'ocul. **187**:1085-1092, Dec., 1954.

Artificial lighting is often unjustly blamed for headaches, eye fatigue, progressive ametropia, and even conditions such as cataract or detachment of the retina. In changing from incandescent to fluorescent lighting, two precautions should be taken. First, an illuminating engineer should be consulted. Second, the eyes of those who will be working under the new lighting conditions should be examined, so that asthenopia due to ametropia or ocular muscle imbalance will not be attributed to the fluorescence. (13 references)

John C. Locke.

Davis, C. J., and Jobe, F. W. **The variation of visual characteristics in school children as measured by the ortho-rater.** Am. J. Optometry **32**:251-258, May, 1955.

These research workers from Bausch and Lomb state that the Ortho-Rater can be used to screen school children. Visual standards for referral are discussed. About 30 percent of school children fail the test and should be referred. Paul W. Miles.

Davis, C. Jane. **Some ways optometry can help the industrial worker.** Am. J. Optometry **32**:229-238, May, 1955.

Studies in industry show that people do not know when their eyes are inefficient. They postpone making changes in glasses, or starting to wear bifocals long after their work begins to decline. In a younger group, 60 percent did not wear glasses and had never had their eyes examined. In a presbyopic group, 30 percent had no glasses, 12 percent had no bifocals and 7 percent wore their glasses irregularly. In all groups, it was very common for workers to have glasses, but not to wear them on the job. This is an excellent paper because of its emphasis on teaching the patient the possibilities and the limitations of occupational glasses. Paul W. Miles.

Foster, John. **Efficiency and the ophthalmodiagnostic process.** A.M.A. Arch. Ophth. **53**:369-381, March, 1955.

This most interesting and philosophic article is a Charles H. May Memorial Lecture given by an Englishman to a group of American ophthalmologists. Many means of being more efficient are described. Reports of efficiency experts are included; one found that patients waited an average of 54 minutes for 8 minutes of medical attention. A secretary standing by for dictation spent 140 minutes in waiting to do 9 minutes of stenography. (4 figures) R. W. Danielson.

de Gennaro, Guiseppe. **Visual acuity and suitability for work.** Gior. ital. oftal. **8**:159-172, March-April, 1955.

The author shows how important it is to examine the visual acuity in particular, and the function of the eyes in general, before employing persons for specific jobs. It would be advantageous if such an examination (which should be carried out by an eye specialist) were carried out in subjects between the ages of 10 and 15 years, so that the data could be used for professional guidance. (8 references)

V. Tabone.

Guth, Sylvester K. **Results of better lighting in industry.** Am. J. Optometry **32**:249-250, May, 1955.

Several specific examples were given of increase in industrial production following improvement in factory lighting.

Paul W. Miles.

Hirsch, Monroe J. **The relationship of school achievement and visual anomalies.** Am. J. Optometry **32**:262-270, May, 1955.

School teachers are advised that, in general, school achievement is less related to visual anomalies than one might expect. Two common anomalies decrease reading efficiency: uncorrected hypermetropia and heterophoria. Myopia is a biological anomaly due to growth and hormonal changes. It does not necessarily follow school work, and does not interfere with reading. Paul W. Miles.

Lamb, Adrian. **Thomas Elliot, 1817-1859, a forgotten ophthalmologist.** Brit. J. Ophth. **39**:184-186, March, 1955.

Thomas Elliot, a Scotsman, was probably the first ophthalmic surgeon to operate on the muscle of the normal or nonsquinting eye and much of his observations hold true today. He worked without any anesthesia and wrote: "in operating upon children, it is advisable to secure the legs and feet to the chair. The operation I have frequently performed in 15 seconds." He defined accurately both paralytic and concomitant strabismus, described eccentric fixation or "fake" macula, and understood the rationale of occlusion in the treatment of amblyopia. A memorial plaque to him rests in the Carlisle Cathedral. (1 figure, 4 references)

Morris Kaplan.

Ross, James A. **A patron saint for British ophthalmologists.** Brit. J. Ophth. **38**: 634-635, Oct., 1954.

The legend of Saint Medana is told. Born of an illustrious family she was remarkable for the beauty of her eyes. Pursued by a knight, she took refuge with her attendants on a rock off the Irish shore. Miraculously, this became a boat and in it they crossed to Scotland. Her suitor followed but she took refuge in a tree where, in his presence, she plucked out her eyes and cast them on the ground at his feet. A spring of water appeared and in that she washed the blood from her face. Thereafter it bore her name.

Under her invocation many chapels were erected. The ruins of one still exist. Here was her shrine and three of the four wells are known to bear her name. These "wells" had no spring to supply them, being filled by the sea at full tide. Also on the Collis Credulitatis was erected a chapel dedicated to Saint Medana. To her ancient shrine, still to be seen, came the sick, and in one of her wells their eyes were bathed. The water from this well was sold as a cure for sore eyes.

Orwyn H. Ellis.

Sinclair, A. H. H. **A short note on the Ross Foundation and the discovery and use of albucid soluble (sodium sulphacetamide) in ophthalmology.** Brit. J. Ophth. **39**:187-191, March, 1955.

The W. H. Ross Foundation for the Study of the Prevention of Blindness was begun in Edinburgh in 1935 and has since sponsored much research in eye diseases, particularly in industrial ophthalmology. Under its auspices albucid (sodium sulfacetamide) was discovered. (3 references)

Morris Kaplan.

NEWS ITEMS

Edited by Donald J. Lyle, M.D.
601 Union Trust Building, Cincinnati 2

News items should reach the editor by the 12th of the month but, to receive adequate publicity, notices of postgraduate courses, meetings, and so forth should be received at least three months before the date of occurrence.

Deaths

Dr. Meyer Backer, Chicago, Illinois, died May 13, 1955, aged 45 years.

Announcements

Memphis convention

The annual convention of the Memphis Eye, Ear, Nose, and Throat Society will be held February 11, 12, and 13, 1956. Guest speakers will be: Dr. Georgiana Dvorak-Theobald, Oak Park, Illinois; Dr. Alson E. Braley, Iowa City, Iowa; Dr. Harvey E. Thorpe, Pittsburgh, Pennsylvania; Dr. Alden H. Miller, Los Angeles, California; Dr. David E. S. Wishart, Toronto, Ontario; Dr. Edmond Prince Fowler, Jr., New York.

Miscellaneous

Winifred Hathaway Memorial Fund

At the suggestion of the many friends and associates of Winifred Hathaway a Winifred Hathaway Memorial Fund has been established by the National Society for the Prevention of Blindness. This fund will be devoted to extending the society's work in the education and health of partially seeing children. Contributions designated for the fund may be sent in care of the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, New York.

Mrs. Hathaway joined the National Society in 1916 and for 24 years was its associate director. She initiated its campaign of professional education, working particularly on the promotion of educational facilities for partially seeing children. Shortly before her death last December she completed the latest revision of *Education and Health of the Partially Seeing Child*, the standard textbook used throughout the world.

Societies

Section officers

At the annual meeting of the Section on Ophthalmology, American Medical Association, the following officers of the section were elected: Chairman, Dr. A. D. Ruedemann, Detroit; vice chairman, Dr. John B. Hitz, Milwaukee; secretary (elected in 1953 for three years), Dr. Harold G. Scheie, Philadelphia; delegate (re-elected in 1954 for two years), Dr. William L. Benedict, Rochester, Minnesota; alternate delegate (re-elected in 1954 for two years), Dr. Harvey Thorpe, Pittsburgh.

Chicago officers

Dr. Daniel Snydacker was elected president of the Chicago Ophthalmological Society for the 1955-56 year at the annual meeting of the society. Dr. Kenneth L. Roper was named president-elect and will assume office in May, 1956.

Other officers elected were Dr. Edward C. Albers of Champaign, Illinois, vice-president; Dr. Edward J. Zeiss of Appleton, Wisconsin, councillor; and Dr. David Shoch, corresponding secretary. Dr. Frank W. Newell was re-elected secretary-treasurer.

Brooklyn society

At the 133rd regular meeting of the Brooklyn Ophthalmological Society, six case abstracts were presented: "Encystation (?) of the macula," Dr. Edward Saskin; "Intraorbital mass," Dr. Seymour S. Van; "Scleritis and keratitis associated with Felty's syndrome," Dr. Paul J. Ostriker; "Cystic remnant of a persistent hyaloidal system," Dr. Abraham Cohen; "Leiomyosarcoma of the iris," Dr. Henry Frankel; "Successful cataract surgery in Marfan's disease," Dr. A. Benedict Rizzuti.

New York officers

The newly elected officers of the New York Society for Clinical Ophthalmology for the 1955-56 season are:

President, Dr. Bernard Kronenberg; vice-president, Dr. Max Chamlin; recording secretary, Dr. Jesse M. Levitt; corresponding secretary, Dr. Leon H. Ehrlich; treasurer, Dr. Henry M. Kera; historian, Dr. Robert S. Coles.

The chairman of the various committees are: Program, Dr. Abraham Schlossman; instructive session, Dr. Arthur Linksz; legislative, Dr. Benjamin C. Rosenthal; membership, Dr. Howard Agatston; industrial, Dr. Edward M. Douglas.

Colorado meeting

Guest speakers at the postgraduate course in ophthalmology and the summer convention of the Colorado Ophthalmological Society held at the University of Colorado School of Medicine, Denver, July 25th through 28th were: Dr. Bernard Becker, Saint Louis; Major Frederick C. Carriker, Fitzsimons Army Hospital, Denver; Dr. Donald J. Lyle, Cincinnati; and Dr. Robert Schimek, Detroit. On the instructional staff were:

Dr. Robert K. Anderson, Dr. William M. Bane, Dr. Katharine H. Chapman, Dr. Ralph W. Daniel-

son, Dr. John A. Egan, Dr. C. Wesley Eisele, Dr. Joseph E. Koplowitz, Dr. Vincent A. Lagorborg, Dr. John C. Long, Dr. Whitney, C. Porter, Dr. Harvey S. Rusk, Dr. J. Leonard Swigert, Dr. George S. Tyner, Dr. Thomas M. Van Bergen, and Dr. Paul C. Wetzig.

Papers presented during the four-day session included:

"Diagnosis and localization of neuro-ophthalmological lesions in infancy and childhood," Dr. Donald J. Lyle; "Goniopuncture," Dr. George S. Tyner; "Aberrant regeneration of the third cranial nerve," Dr. Paul C. Wetzig; "Recent advances in glaucoma: Pathogenesis and diagnostic methods," Dr. Bernard Becker; "Modern concepts in ocular microbiology," Dr. Joseph E. Koplowitz; "Intraocular hemorrhage," Major Frederick R. Carriker.

"A simplified entropion operation," Dr. Robert Schimek; "Lesions of the middle fossa," Dr. Lyle; "Recent advances in glaucoma: Therapy," Dr. Becker; "Pathogenesis of retinal detachment," Major Carriker; "Ptosis procedures," Dr. Schimek.

"Ophthalmologic symptoms and localization of lesions in head injury," Dr. Lyle; "Use of the cross cylinder," Dr. Egan; "Retinal vascular disease: Diabetes," Dr. Becker; "The pathology of corneal disease," Major Carriker; "What we should know about dispensing," Dr. Harvey S. Rusk; "Toxoplasmosis," Dr. C. Wesley Eisele; "Retinal vascular disease: Hypertension," Dr. Becker; "Irritation and destructive lesions of the cortical areas," Dr. Lyle.

Canadian society

At the recent annual meeting of the Canadian Ophthalmological Society, the following officers were elected: President, Dr. Henri Pichette, Quebec; vice-president, Dr. John McLean, Vancouver; secretary, Dr. R. G. C. Kelly, Toronto; treasurer, Dr. Benjamin Alexander, Montreal; editor-in-chief of the of the *Transactions*, Dr. Clement McCulloch, Toronto.

Military ophthalmologists

The Society of Military Ophthalmologists and the Society of Military Otolaryngologists will hold a joint dinner meeting during the annual meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago in October.

Cocktails and dinner will be served at 6:30 p.m. on October 11, 1955, at the Palmer House. The dinner will be followed by a short business meeting.

All members of the Society of Military Ophthalmologists and the Society of Military Otolaryngologists are invited to attend. Application may be made either to Capt. James A. Stokes (MC), secretary-treasurer, Society of Military Ophthalmologists, Eye Clinic, Walter Reed Army Hospital, Washington 12, D.C., or to Lt. Col. Frank A. Perri (MC) 3650 USAF Hospital, Box 485, Sampson Air Force Base, New York.

Personals

Col. William L. Spaulding, Washington, D.C., has been named chief of the ophthalmology service at Walter Reed Army Hospital. This is Colonel Spaulding's third duty tour at Walter Reed where he served as resident in 1939, returning in 1945 for further work. Colonel Spaulding succeeds Col. John H. King, Jr., who will leave military service for private practice in Washington.

Dr. Richard C. Troutman, assistant professor of ophthalmology at the New York Hospital-Cornell Medical Center, has been appointed professor of ophthalmology and director of the Division of Ophthalmology of the State University of New York College of Medicine at New York City. He is also director of the ophthalmologic service at Kings County Hospital.

The Sixth Annual Meeting of the New Orleans Academy of Ophthalmology will be held in New Orleans, Roosevelt Hotel, January 3-6, featuring "Diseases and Surgery of the Lens". The registration fee of $75.00 includes membership in the Academy for the year 1956. Hotel reservations should be made early by writing to the Roosevelt or 211 S. Saratoga St., New Orleans, La.

Ophthalmologica

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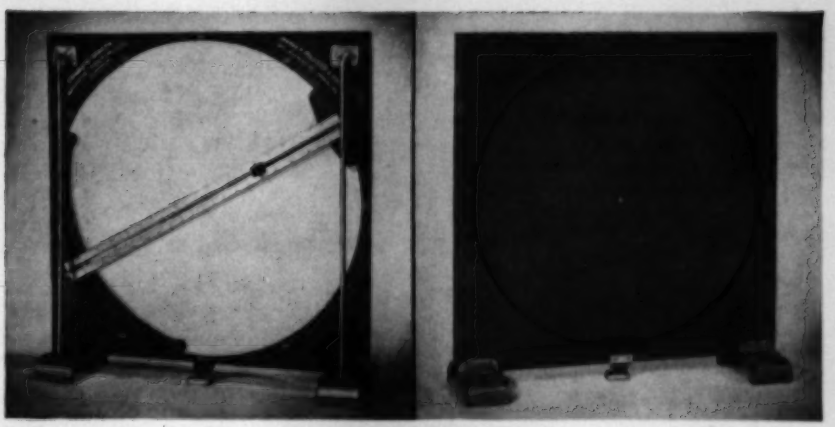

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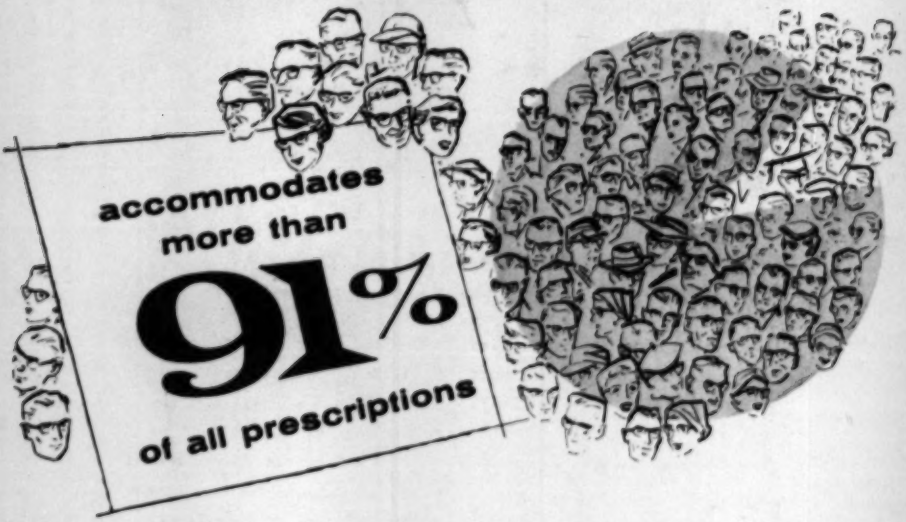

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